

Administrative Report

For the (Sixth)

Kentucky Geological Survey

(Years 1928 and 1929)

By

WILLARD ROUSE JILLSON

Director and State Geologist

KENTUCKY GEOLOGICAL SURVEY

FRANKFORT, KENTUCKY

1929

The
Kentucky Geological
Survey

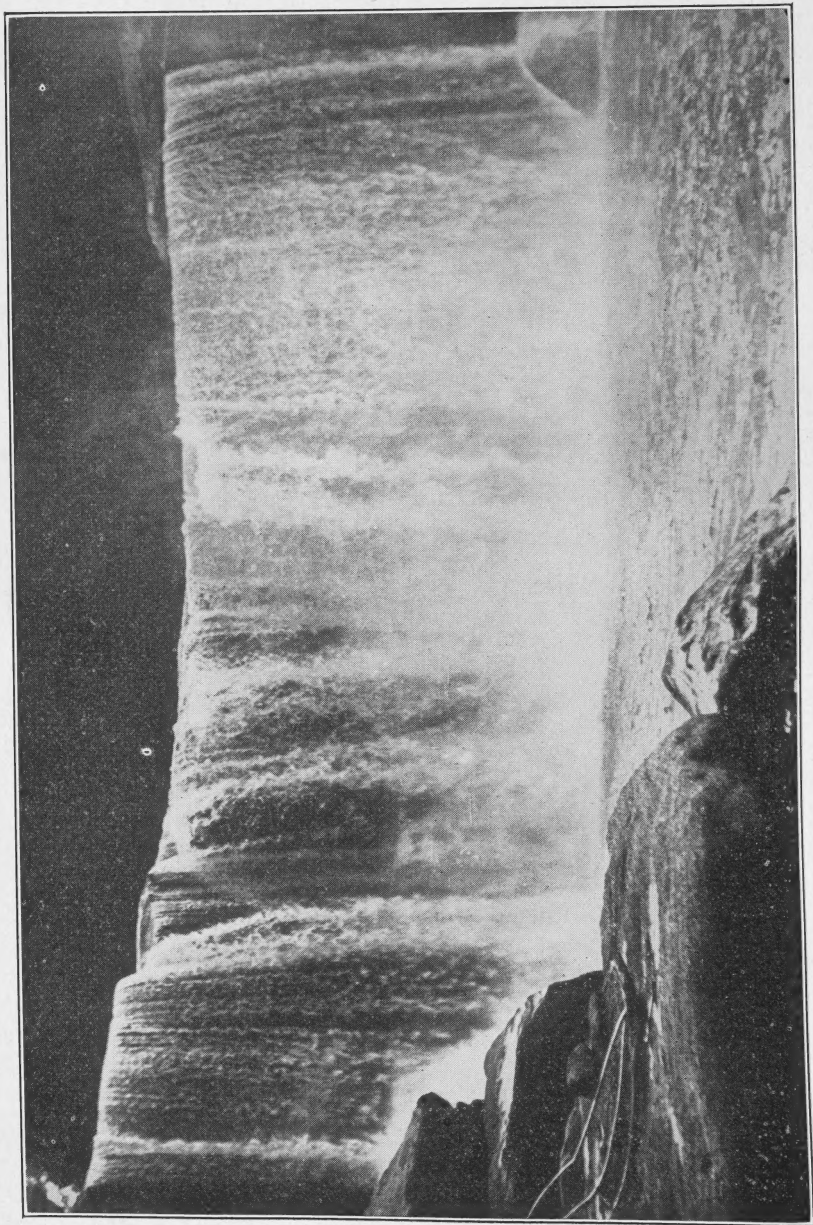
WILLARD ROUSE JILLSON
Director and State Geologist



SERIES VI
PAMPHLET XXII

Administrative Report
(1928-1929)

1929



THE FALLS OF THE CUMBERLAND
This splendid cataract important because of its outstanding scenic and hydroelectric potentialities continues to absorb public attention generally. It is the largest waterfall in Kentucky and the South.

ADMINISTRATIVE REPORT

For the (Sixth)

KENTUCKY
GEOLOGICAL SURVEY

YEARS 1928 AND 1929

By

WILLARD ROUSE JILLSON

*Director and State Geologist, Curator, Kentucky
State Museum*

PREPARED FOR THE GOVERNOR
AND THE LEGISLATURE

*Forty Maps, Graphs and Illustrations and One
Topographic Index Map of Kentucky*

KENTUCKY GEOLOGICAL SURVEY
FRANKFORT, KENTUCKY
1929

THE STATE JOURNAL COMPANY
Printer to the Commonwealth
Frankfort, Ky

Administrative Report
(1928-1929)

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For the (Sixth)

KENTUCKY GEOLOGICAL SURVEY

Years 1928 and 1929

By

WILLARD ROUSE JILLSON

Director and State Geologist

Curator, Kentucky State Museum

GOVERNING STATUTES

The acts creating and governing the (Sixth) Kentucky Geological Survey and making appropriations for same are five and are entitled as follows:

I. "An act creating the Kentucky Geological Survey, designating it chief executive officer and his duties, and providing funds for its maintenance."¹

II. "An Act appropriating money for the operation and maintenance of the various departments, boards, commissions, institutions and agencies of the state government for the fiscal year ending June 30, 1929."²

III. "An Act appropriating money for the operation and maintenance of the various departments, boards, commissions, institutions and agencies of the state government for the fiscal year ending June 30, 1930."³

These Acts provided an annual total of \$115,000.00 for the maintenance of the various activities of the Kentucky Geological Survey. The appropriation is divided into two funds: (1) Co-operative topographic mapping fund of \$75,000.00, and (2) General geological fund of \$40,000.00. In accordance with the statute the first fund \$75,000.00 was appropriated to be used in a "dollar for dollar" co-operation with the U. S. Geological Survey in an extension of the topographic base map of Kentucky.

¹ Acts of the General Assembly of the Commonwealth of Kentucky, Chapter 34, p. 141. 1920.

² Acts of the General Assembly of the Commonwealth of Kentucky, Chapter 11, Section 29, pp. 29-30; and Section 49, p. 43, 2d paragraph, 1928.

³ Acts of the General Assembly of the Commonwealth of Kentucky, Chapter 12, Section 29, p. 58 and Section 49, p. 71, 2d paragraph, 1928.

This appropriation of \$75,000.00 was made available from the revenues of the State Department of Public Roads "upon the advice and recommendation of the Governor." The topographical base mapping outlined in the governing statute was carried forward during the entire two-years period provided for by the legislature. The second or general fund of \$40,000.00 annually was appropriated in the two budget bills of 1928 and has been used for the maintenance of the Kentucky Geological Survey proper, payment of salaries, field expense, and miscellaneous charges, including all kinds of printing.

IV. "An Act to repeal, amend and re-enact section 3 of chapter 34 of the Acts of the General Assembly of Kentucky, 1920 session, touching the Kentucky Geological Survey."¹

This act amending section 3, chapter 34, of the Acts of 1920, relating to the Kentucky Geological Survey has operated to give the Director of the Survey a broader field of service to the people of Kentucky. By virtue of this act he became the Curator of the mineral and fossil collections of the Kentucky Geological Survey in the custody of the University of Kentucky at Lexington, and is authorized to arrange them for proper public preservation. He is given further authority to lecture on subjects pertaining to the geology, mineral and natural resources of Kentucky. The provisions of this Act have been complied with during the past biennium, as will be outlined later in the report.

V. "An Act to amend and re-enact Section 8 of Chapter 34 of the Acts of the General Assembly of Kentucky of 1920, said act being entitled 'An Act creating the Kentucky Geological Survey, designating its executive officer and his duties and providing funds for its maintenance,' and provide for the examination of certain road materials and other minerals and for the immediate publication of geological reports and maps, and making an appropriation therefor."²

This Act provided funds over a two year period of 1928 and ending June 30, 1929 for the execution of a number of important activities of the Survey as is indicated in the above excerpt from the Acts of the General Assembly. The principal feature

¹ Acts of the General Assembly of the Commonwealth of Kentucky, Chapter 140, pp. 485-86. 1924.

² Acts of the General Assembly of the Commonwealth of Kentucky, Chapter 149, pages 518 to 521. 1928.

provided for was the examination of cement and other road materials in Kentucky. This investigation was undertaken forthwith and has been completed. All of the maps involving new cement material locations, the result of detailed field studies, have been published as have been the unpublished manuscript maps which were available at the time the appropriation was made. Reference to the cement and other mineral resource investigations issued under this Act will be made elsewhere in this report.

PERSONNEL OF THE SURVEY

The personnel of geological assistants and trained office workers employed on the (Sixth) Kentucky Geological Survey during the past biennium is given below. All of these assistants, with the exception of the Director's Secretary and Chief Clerk, are classified as "temporary employees" having been engaged for the summer field season of two or three months to do a special piece of geological or mineral resource investigation:

DIRECTOR AND STATE GEOLOGIST

WILLARD ROUSE JILLSON, B. S., M. S., Sc. D., Frankfort, Kentucky.²

ASSISTANT GEOLOGISTS—TEMPORARY

JOSEPH KENT ROBERTS, Ph. D., University of Virginia, Charlottesville, Va.

ARLE HERBERT SUTTON, Ph. D., University of Illinois, Urbana, Ill.

PAUL HEANEY DUNN, A. B., A. M., Miami University, Oxford, Ohio.

WILBUR G. BURROUGHS, M. S., Head of the Department of Geology, Berea College, Berea, Ky.

ARTHUR C. MCFARLAN, Ph. D., Head of the Department of Geology, University of Kentucky, Lexington, Ky.

WILLIAM H. SHIDELER, Ph. D., Head of the Department of Geology, Miami University, Oxford, Ohio.

JOHN G. WOODRUFF, B. S., M. S., Colgate University, Hamilton, New York.

L. C. GLENN, Ph. D., Head of the Department of Geology, Vanderbilt University, Nashville, Tenn.

JOHN J. WOLFORD, A. B., M. A., Xenia, Ohio.

CHARLES V. THEIS, C. E., Ph. D., University of Cincinnati, Cincinnati, Ohio.

LEWIS CASS ROBINSON, S. B., S. M., University of Kentucky, Lexington, Ky.

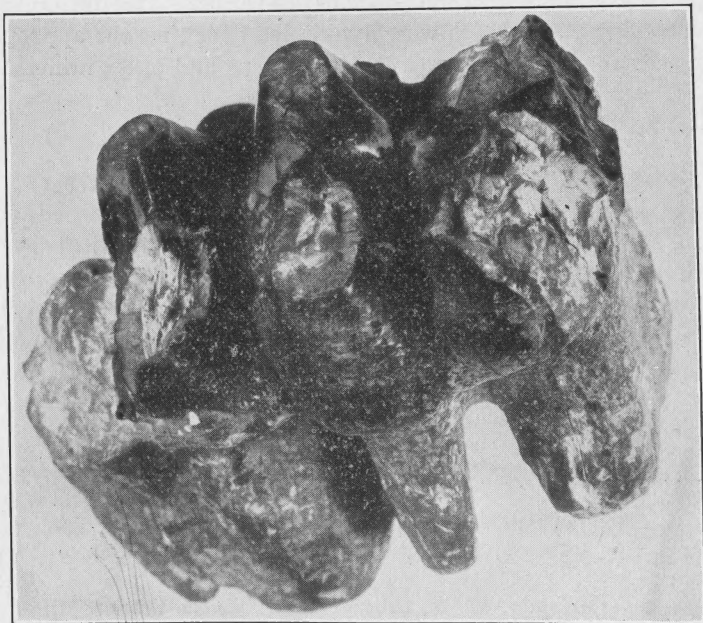
A. K. LOBECK, A. M., Ph. D., University of Wisconsin, Madison, Wisconsin.

W. H. TWENHOFEL, B. A., M. A., Ph. D., University of Wisconsin, Madison, Wisconsin.

DAVID B. CHISHOLM, A. M., New York University, New York City.

REINHARDT T. LIESSEN, Ph. D., Pittsburgh, Pa.

SAMUEL M. MAYFIELD, A. B., Berea College, Berea, Kentucky.



MASTODON TOOTH FROM THE WAR FORK

This Jackson County fossil and another of similar appearance from Magoffin County constituted two important vertebrate finds during the past two years. Both localities are new. The Director has described and exhibited these specimens before the Kentucky Academy of Science.

GEOLOGIC AIDES—TEMPORARY

RAYMOND MILLER, B. S., Cecelia, Kentucky.

REID PHILIP MEACHAM, Lexington, Kentucky.

SPENCER WITHERS, B. S., Powderly, Kentucky.

CHAS. W. WILSON, JR., B. A., Mayfield, Ky.

JAMES S. CULLISON, A. B., Lawrenceville, Ill.

J. A. CULBERTSON, A. B., M. S., University of Illinois, Urbana, Ill.

O. E. WAGNER, A. B., M. A., No. 3857 N. Hermitage Ave., Chicago, Ill.

BERYL BEAN, A. B., Sullivan, Illinois.

DEAN H. CRABB, B. S., Macomb, Illinois.

JUDSON R. GRIFFIN, A. B., M. A., Champaign, Ill.

LAWRENCE FREEMAN, B. S., No. 134 Clare Avenue, Louisville, Ky.

FIELD ASSISTANTS—TEMPORARY

GUY H. BRIGGS, JR., B. S., Lexington, Kentucky.

GEORGE R. WESLEY, Middleburg, Ky.

SIDNEY S. GOODWIN, B. Sc., University of Cincinnati, Cincinnati, Ohio.

W. E. BACH, B. S., No. 625 Sayre Avenue, Lexington, Ky.

J. L. WATKINS, Shelbyville, Ky.

LEONARD GIOVANNOLI, A. B., M. A., No. 162 N. Ashland Ave., Lexington, Ky.

PHIL ASWERUS, Dry Ridge, Kentucky.

HUGH TIM RICHARDSON, B. S., Tompkinsville, Ky.

JAMES K. ROGERS, A. B., Department of Geology, University of Cincinnati, Cincinnati, Ohio.

RODMEN—TEMPORARY

M. CLAY ROFF, Cloverport, Kentucky.

CLELLAND WALTERS, Harrodsburg, Kentucky.

THOMAS JACKSON, JR., Danville, Kentucky.

VARIOUS ASSISTANTS—TEMPORARY

ROY L. MOODIE, Ph. D. (Paleontologist), Los Angeles, Cal.

CHARLES W. THORNTHWAITTE, Ph. D. (Geographer), Norman, Okla.

WILLIAM H. GILL, Draftsman, A. B., C. E., Woodmont Ave., Cherrydale, Va.

WILLIAM SNYDER WEBB, B. S., M. S. (Archaeologist), University of Kentucky, Lexington, Ky.

W. D. FUNKHOUSER, Ph. D. (Archaeologist), University of Kentucky, Lexington, Ky.

OTTO A. ROTHERT, B. S., Indexist, Louisville, Ky.

E. A. MARES, Accountant, Lawrenceburg, Ky.

CATHERINE B. McNAMARA, Frankfort, Kentucky, Secretary.*

HATTIE M. SCOTT, Frankfort, Kentucky, Chief Clerk.* †

OLIVE DAY, Morehead, Kentucky, Clerk.*

JERRY L. SAMUELS, Porter and Janitor, Frankfort, Ky.

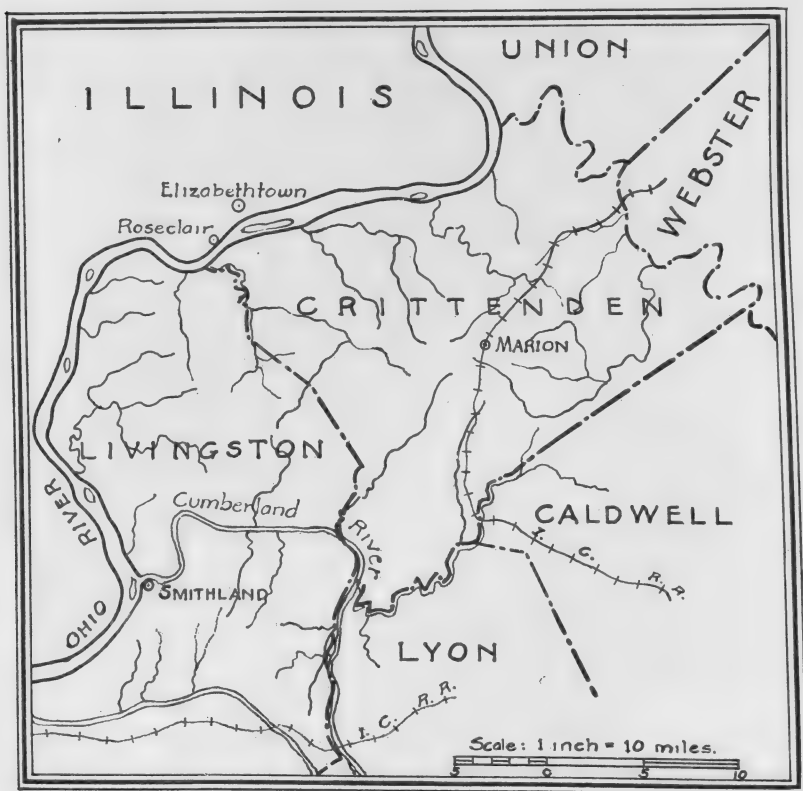
SUMMARY OF ACTIVITIES

During the past biennium (1928-1929) the work of the Kentucky Geological Survey has consisted of various detailed and general geological and mineral resource investigations, and mapping projects widely distributed through Kentucky. In the fluorspar field of Livingston, Crittenden, Lyon and Caldwell counties, Dr. A. H. Sutton continued his studies of the structure and stratigraphy of the Mississippian rocks and their contained deposits of fluorspar. Outcrops of the Pennsylvanian, Creta-

* Permanent employees.

† Resigned.

aceous and more recent deposits have also been worked. His work was confined chiefly to the Eddyville and Smithland quadrangles. Each of these quadrangles has been completely mapped and is being drafted preparatory to printing. A brief report on the 'Geology of Northern Hardin County, Ky., was completed as a manuscript by Dr. Sutton early in 1929.



WESTERN KENTUCKY FLUORSPAR FIELD

This important area in which work has been in progress since 1920 is now completely mapped topographically and geologically. Separate county geological maps are available as are a number of detailed reports all of recent date.

During the past two years Dr. L. C. Glenn has continued his study and manuscript preparation of the Pennsylvanian sequence and structure of the Western Kentucky Coal Field. This report will be of much value when it appears because of the growing oil and gas development in this part of the State.

Dr. Joseph Kent Roberts of the University of Virginia together with C. W. Wilson, Jr., of Princeton University, and Professor Reid P. Meacham, of the University of Kentucky, were engaged during the past summer in surveying the areal geology of the Jackson Purchase region. As a result of this the entire Purchase was covered by reconnaissance methods, and the detailed geology of McCracken, Marshall and Calloway counties was executed. Since the closure of this work in the early fall the McCracken and Calloway county colored geological maps have been published separately and Marshall will soon follow. The geology for Fulton, Hickman, Carlisle, Ballard and Graves counties is available and waits funds for publication.

Professor Paul H. Dunn of the University of Miami executed during the field season of 1928 the areal geology of Bourbon and a portion of Harrison county. During the past field season—1929—he completed Harrison county and executed the areal geology of Bracken and a portion of Mason. As a result of this work the Bourbon and Bracken county geological maps are now published in colors and the new Harrison and Mason county geological manuscripts are ready and await funds for this purpose.

Professor W. G. Burroughs of Berea College has been engaged at various times during the past biennium in the preparation of two manuscripts reports: (1) "Hand Book of Elevations in Kentucky," and (2) "The Influence of Geology and Geography on the Development of Kentucky." Of these the first has been completed in manuscript form and will be published as soon as funds are available. It presents 6,057 Bench Marks accurately described. The latter is still in process of writing.

Dr. Arthur C. McFarlan, of the University of Kentucky, in 1928, assisted by Mr. Sidney S. Goodwin, completed the areal geology of Montgomery county, and, with the assistance of Mr. George R. Wesley, completed the areal geology of Lincoln county. Both of these important maps have since been published in colors. In 1920 Professor McFarlan, assisted by Mr. Goodwin, executed the areal geology for Mercer and Madison counties; and both of these manuscript maps are ready for the printer and will be published as soon as funds are available.

Dr. William H. Shideler, of the University of Wisconsin, executed areal geological surveys for Spencer, Trimble, Carroll and Nelson counties. The geology of the southern portion of Nelson county was executed by Mr. Guy Briggs, Jr., and Mr. Raymond Miller.

Professor John G. Woodruff, of Colgate University, Hamilton, New York, executed during the past field season—1929—the areal and structural geology of Muhlenberg county, and this map is now being drafted for publication.

Professor J. J. Wolford, of Xenia, Ohio, executed the detailed areal geology of the Lockport quadrangle during the field season of 1928, and during the past season of 1929 completed the areal geology of Robertson and Nicholas counties, and a portion of Mason county. Each of these maps is now in the hands of the draftsman preparatory to publication.

Professor Lewis C. Robinson, of the University of Kentucky, completed the detailed areal and structural geology of McLean county during the past field season (1929) and this manuscript is now in the hands of the printer and will be published during January, 1930. Professor Robinson completed in 1928 his manuscript report entitled, "The Vein Deposits of Central Kentucky." It is hoped to publish this soon.

Dr. A. K. Lobeck, formerly of the University of Wisconsin now of Columbia University, completed during 1928 a study of the "Geology and Physiography of the Mammoth Cave National Park Region," and this has been published as pamphlet No. XXI. During the season of 1929, Dr. Lobeck executed a similar piece of work—"The Geology and Physiography of the Midland Trail in Kentucky," from Catlettsburg through Ashland, Lexington, Louisville, Owensboro and Paducah to Wickliffe. This latter manuscript is now in the printer's hands and will be issued early during this winter.

Professor Samuel M. Mayfield of Berea College together with Mr. Spencer Withers during the field season of 1928 completed new areal outcrop work for Pulaski county, as a result of which there is now in the course of distribution a new colored geological map of Pulaski county.

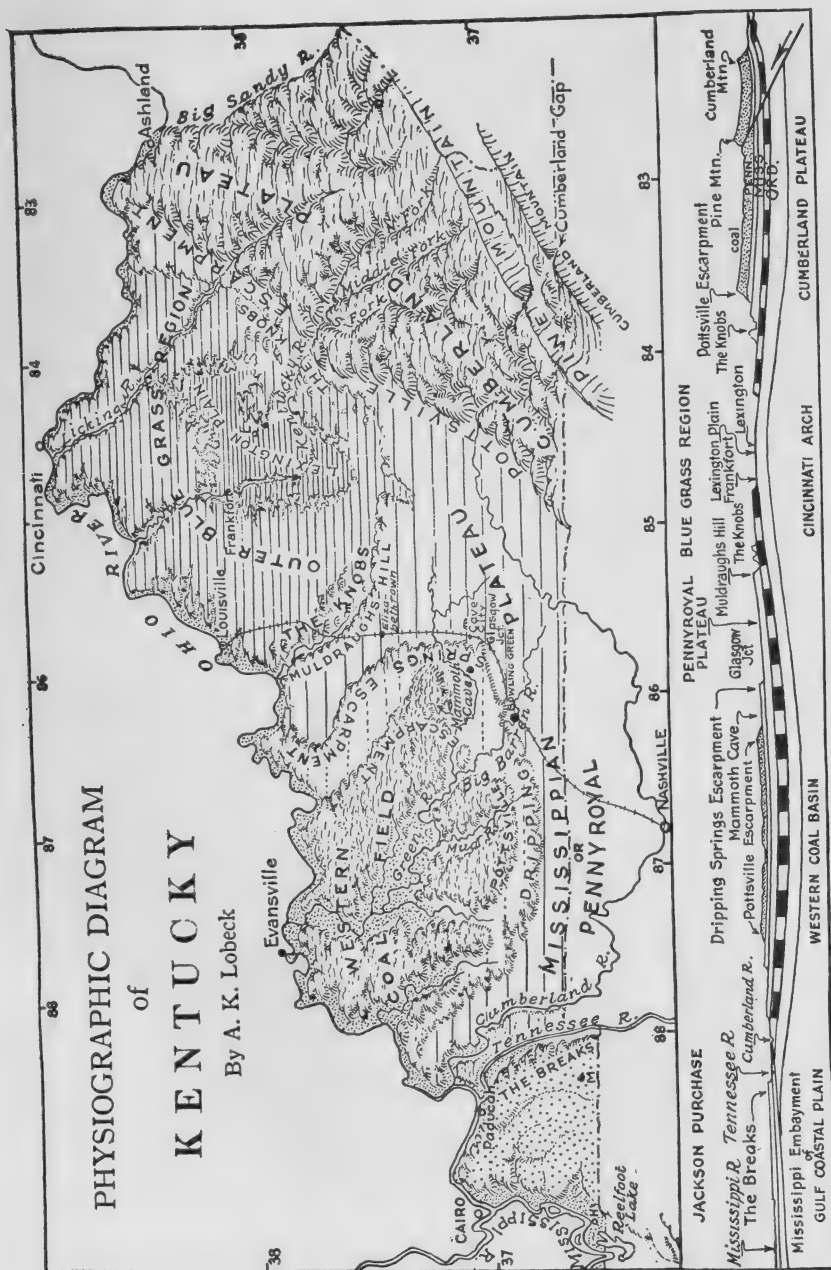
Late in the field season of 1928, Messrs. Raymond Miller, Spencer Withers, Guy H. Briggs, Jr., George R. Wesley, Sidney

PHYSIOGRAPHIC DIAGRAM

of

KENTUCKY

By A. K. Lobeck



INDEX TO THE GEOLOGICAL CROSS-SECTION

PHYSIOGRAPHIC DIAGRAM OF KENTUCKY WITH GEOLOGICAL CROSS-SECTION

S. Goodwin and W. E. Back executed the areal geology of Bath and Boyle counties, since when these county maps have been published in colors, and are now in the course of distribution.

The past biennium has witnessed the completion of the first comprehensive presentation of the important subject of sedimentation in this Commonwealth entitled "The Building of Kentucky," by Dr. W. H. Twenhofel. This report is now ready for publication.

During the past field season—1929—under the field direction of Dr. A. H. Sutton, Messrs. James S. Collison, James A. Culbertson, O. E. Wagner, Beryl Bean, Dean H. Crabb and Judson R. Griffin completed the areal and structural geology of the Big Clifty, Hardinsburg, Leitchfield, Spring Lick and Brownsville quadrangles. The Butler county portions of the Spring Lick quadrangle had already been completed and published, as had also the Edmonson county part of the Brownsville quadrangle.

Professor J. J. Wolford completed and delivered his manuscript on, "The Geology of the Lockport Quadrangle" on January 20, 1929.

Toward the end of the summer of 1929, the areal geology of the Tompkinsville and Lilydale quadrangles was completed in the same manner; and still later in the season the Kentucky portion of the Byrdstown and Buck Lodge sheets was executed by Messrs. Raymond Miller and Dean Crabb. Just before the close of the fall season, Mr. Dean Crabb executed the geology of the Morehead quadrangle with some assistance from Mr. Sidney S. Goodwin.

In the field season of 1928, Messrs. Freeman and Mayfield executed the areal and structural geology of Estill county, assisted by Dr. A. H. Sutton; while during the same season, Messrs. Briggs and Miller executed the areal geology of Oldham, Powell and Bullitt counties; each of these county maps have now been published and are in the course of distribution. Messrs. Briggs and Miller also surveyed a new base and completed the areal and structural geology of Marion county and this work is now in the hands of the draftsman.

Early in the month of January, 1929, Mr. J. L. Watkins, of Shelbyville, executed a small large scaled contoured topo-

graphical map of the Lincoln farm in Larue county, and this is in the course of distribution as a photostat.

During the past year Dr. Roy L. Moodie of Los Angeles has completed his manuscript entitled, "The Geological Succession of Life in Kentucky," and this will be published during 1930.

During the early fall of 1928 and spring of 1929 Mr. William E. Back of Lexington, Kentucky, executed original surveys for Madison and Washington counties, both of which have been drafted and are in the process of early publication.

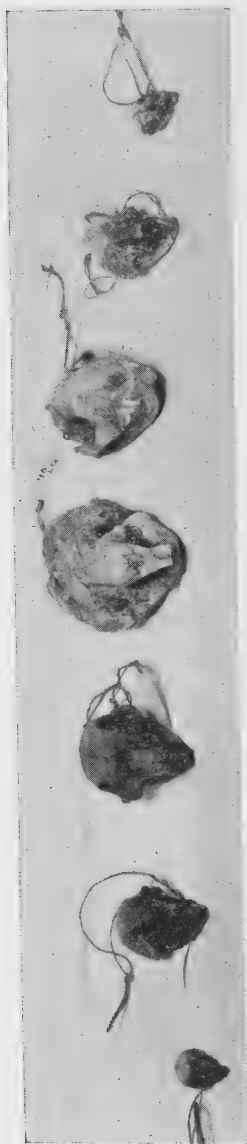
Dr. Charles Warren Thornthwaite completed and delivered his manuscript report entitled, "Louisville, Kentucky—a Study in Urban Geography," on Nov. 1, 1929. This important assignment has been in course of preparation during the last several years.

In the fall of 1928 Messrs. Miller and Briggs executed a new survey, scaled 1 inch to the mile for Carroll county. This map has been published separately and is now combined with the areal geology of this district as a published document.

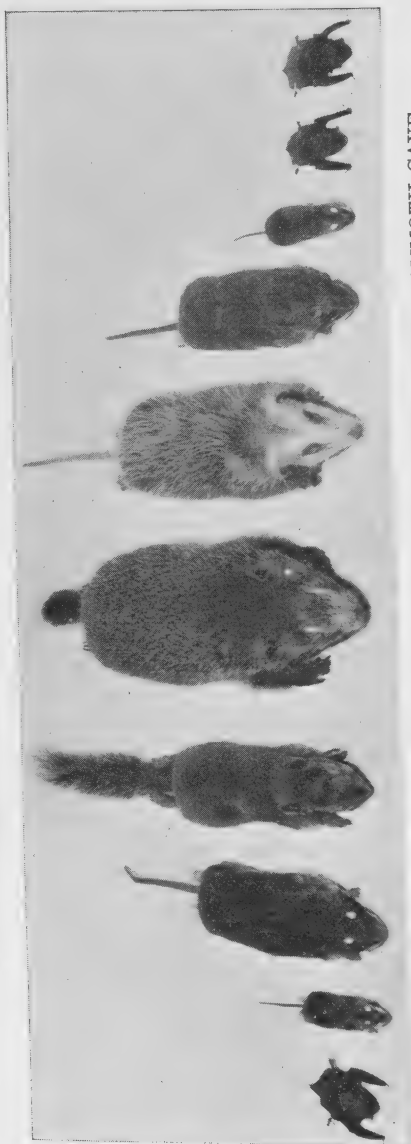
Dr. Reinhardt Theisson completed his study and delivered on October 8, 1929 his manuscript entitled, "Structure and Classification of of Kentucky Cannel Coal."

During the summer and early fall of 1928 Mr. H. T. Richardson of Tompkinsville assisted the Direstor of the Survey in the preparation of the areal and structural layout for the new geological map of Kentucky. Throughout the same season of 1929 Professor Leonard Giovannoli of Lexington, Kentucky, was engaged as a collector of all forms of animal life, mammals, insectovores, reptiles, batrachians, fishes and insects in the Mammoth Cave region; and this collection together with subsequent collections by Mr. Vernon Bailey of the Biological Survey of the U. S. Department of Agriculture, Washington, D. C., is being used as a basis of the study for the preparation of a report by Mr. Bailey, in which he will have the collaboration of his wife in the chapter on birds, of the Animal life of the Mammoth Cave region.

In 1928 a manuscript entitled "Ancient Life in Kentucky" which has been in the course of preparation by Professors W. S. Webb and W. D. Funkhouser of the University of Kentucky, having to do with the archaeology of Kentucky was published



A FEW OF THE RODENT SKULLS COLLECTED NEAR MAMMOTH CAVE



RODENTS, MARSUPIALS AND INSECTIVO RES COLLECTED NEAR MAMMOTH CAVE
Biological Survey of Mammoth Cave National Park, 1929.

in 1928 and has since been in the course of distribution. It is today one of the very popular publications of this Survey.

Prof. David B. Chisholm completed and delivered on September 7, 1928, his manuscript entitled, 'The Cannel Coals of Eastern Kentucky.'

Throughout the years of 1928 and 1929 Mr. Otto A. Rothert, Louisville, Kentucky, has been intermittently engaged in reviewing and indexing all publications, maps and reports of the Kentucky Geological Survey, and in the preparation of a manuscript on same. The need of this proposed report by the public generally as the number of maps and publications relative to the geology and mineral resources of Kentucky grows is becoming more and more certain. It is hoped to have this publication ready for the press during the year of 1930.

"Landslides in Kentucky," the first investigation of its kind in this Commonwealth was completed in 1928 and the manuscript delivered May 18, 1929, by Mr. James K. Rogers of Cincinnati, Ohio.

As in the past the drafting of the detailed reconnaissance and geological base maps of this Survey has been carried forward during the past two years by Mr. W. H. Gill of Washington, D. C.

Upon the request of Mr. C. Frank Dunn, secretary of the Kentucky Progress Commission, in April, 1929, the director of the Geological Survey immediately made available as an act of broad inter-departmental cooperation about \$10,000 worth of photographic views of Kentucky's industry, geology, resources and scenery. These views were transmitted as loaned negatives principally of the size 8 x 10 inches and were printed in a large number by the Kentucky Progress Commission. Subsequently they have been widely used in the Progress magazine and elsewhere. They comprised the entire photographic library of the Geological Survey and had been in process of accumulation since 1918.

WORK BY THE DIRECTOR

In addition to his administrative and executive duties as Director of the Kentucky Geological Survey, the State Geologist, Dr. Willard Rouse Jillson, has carried forward during the

last biennium a number of separate geological projects. All of these have involved field investigation. They are evidenced by several geological papers; one major report of the Survey, Vol. 17, "The Geology and Mineral Resources of Kentucky," a new colored geological map of Kentucky at the scale of 1:500,000 or approximately eight miles to the inch, and at least one book



A NOTABLE KENTUCKY SPRING

This well known spring, included within the Director's work on "Big Springs of the Bluegrass Region," is on Beals Run in northern Woodford County. Willard Jillson, III stands at the pool edge.

concerning itself with historical research. A number of short articles on economic, physiographic, paleontological and administrative geology have been published. Some of these were presented as addresses before educational, scientific and lay bodies in Kentucky and elsewhere. During the year 1928-1929 the Director gave without remuneration a full course of lectures on "The Geology of Kentucky" at the University of Kentucky. A not inconsiderable item in the activities of the State Geologist during the past two years has been the routine checking of various surveys in the field and office. These activities coupled with the execution of some new work, are indicated in the several subsequent entries. A list of the recent publications, books and maps of the State Geologist follows:

1927

Pages

| | |
|---|----|
| Administrative Report (1926-27). Covering the activities of the (Sixth) Kentucky Geological Survey. Prepared for the Governor and the Legislature. 30 illus., 1 topographic index map of Kentucky. Kentucky Geological Survey, Series VI, 1927 | 96 |
|---|----|

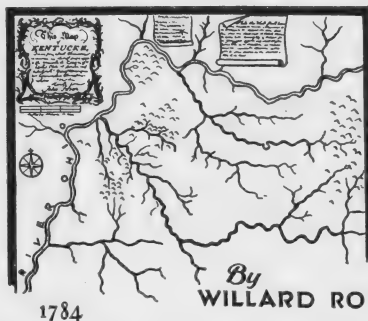
1928

| | |
|--|-----|
| Geology of the Amory Mississippi Gas Field. The oil and Gas Journal. pp. 58, 126, 128. Thursday, Jan. 26, 1928 | 8 |
| Sub-Igneous Natural Gas in Western Kentucky. Paper presented before the Kentucky Academy of Science, Lexington, May 12, 1928 | 2 |
| Kentucky Geological Survey Fluorite Collection. Paper presented before the Kentucky Academy of Science, Lexington, May 12, 1928 | 2 |
| Occurrence of Mastodon Tooth on the War Fork. Paper presented before the Kentucky Academy of Science, Lexington, May 12, 1928 | 2 |
| Early Carbonic Deformation in Western Kentucky. Pan-American Geologist, Vol. XLIX, 3 pp., June, 1928 | 3 |
| Recently Abandoned Entrenched Meander. Pan-American Geologist, Vol. L, 2 pp., August, 1928 | 2 |
| Geology in the Service of a New National Park. Pan-American Geologist, Vol. L, 4 pp. November, 1928..... | 4 |
| A Correlation of the Coals of Western Kentucky, Southeastern Illinois and Southwestern Indiana. The Mining Congress Journal, 3 pp., (914-916), December, 1928 | 3 |
| A Kentucky Geologist One Hundred Years Ago. Engineering and Mining Journal, p. 872, Vol. 126, No. 22; December, 1928..... | 1 |
| Sketches in Geology. A group of twenty-two separate papers on American Geology. 158 pp. Illustrated. C. T. Dearing Printing Co., Louisville, Ky., 1928 | 158 |
| Geology and Mineral Resources of Kentucky. A brief description of the Physiography, Stratigraphy, Areal and Structural Geology, and Mineral Resources of each of the Counties composing the Commonwealth. 251 Illustrations, 409 pp., 1 colored frontispiece of Kentucky Fluorite. Kentucky Geological Survey, Series VI., Vol. XVII., 1928 | 409 |

1929

- Kentucky State Maps.** (A packet.) Kentucky Geological Survey Series VI. Contains: 1. Geological Map of Kentucky, 1927; 2. Base Map of Kentucky, 1928; 3. Relief Map of Kentucky, 1924. Packet issued 1929 3
- Filson's Kentucke.** A facsimile reproduction of the original Wilmington Edition of 1784, with Paged Critique, Sketch of Filson's Life and Bibliography. 208 pp. with facsimile of the first map of Kentucky. Filson Club Publications No. 35. John P. Morton and Company, Louisville, 1929 208

Filson's KENTUCKE



COVER STAMP ON DIRECTOR'S LATEST BOOK

- Geologic Map of Kentucky.** Base scale 1:500,000. Geology and mineral resources shown in 20 separate colors and patterns. New structural and stratigraphic sections and new areal and structural distinctions. Kentucky Geological Survey, Series VI., December 30, 1929 1
- Geology of the Oil Shales of the Eastern United States.** Extract from Comptes-Rendus XIV. Congress Geological International, 1926. Madrid, Spain, 1929 10

Shortly after the publication of "Filson's Kentucke" on December 30th, 1929, the Director presented a copy, with his compliments to Governor F. D. Sampson. The following acknowledgment was subsequently received:

COMMONWEALTH OF KENTUCKY

Executive Chamber

Frankfort

Dr. Willard Rouse Jillson,
Department of Geology,
Frankfort, Kentucky,
Dear Dr. Jillson:—

Good as I expected literary work of your to be, "Filson's KENTUCKE" is far more entertaining, instructive and delightful than I had anticipated.

I regard it as one of the most worthwhile contributions to the early history of our State.

Sincerely yours,

FLEM D. SAMPSON.

January 2, 1930.

Governor.

NEW GEOLOGICAL MAP

The completion and release of the new geological map of Kentucky, scale 1:500,000, during the latter part of December, 1929, has brought forth much favorable comment and an instant and continuing demand. This is quite as it should be since 10 years work on the part of the Sixth Geological Survey under the direction of the State Geologist are represented in this one important publication. Some unsolicited correspondence relative to this map follows:

EASTERN GULF OIL COMPANY, Inc.

504 Security Trust Co. Building

Lexington, Ky.

Jan. 9, 1930.

Dr. W. R. Jillson, Director and State Geologist,
Frankfort, Ky.

My dear Dr. Jillson:

I am enclosing you my check for \$2.00 in payment for the new geological map of Kentucky. It is a very fine piece of work. I also hope that your plans for topographic mapping will go through as the development of the State of Kentucky is more dependent on the completion of a topographic base map than any other one thing.

With kindest personal regards, I am,

Versy sincerely

DANIEL J. JONES,

Geologist.

INLAND GAS CORPORATION, Inc.

Ashland National Bank Building

Ashland, Kentucky

January 11, 1930.

Mr. W. R. Jillson,
State Geologist,
Frankfort, Kentucky.

Dear Mr. Jillson:

I should like to obtain four copies of the New Geologic Map of Kentucky, sent to the address hereon, together with the bill.

At this time I want to congratulate you on the complete detail of this new map. I have seen a copy of it and have heard much very favorable comment.

Yours very truly,

R. B. ANDERSON,

RBA:b

Geologist.

PETROLEUM EXPLORATION, Inc.

300-301 Security Trust Building

Lexington, Ky.

January 9, 1930.

Dr. W. R. Jillson,
Frankfort, Kentucky.

Dear Sir:—

Please allow me to congratulate you upon your new Geological map of Kentucky. I believe it is superior to any of the geological maps published of any of our adjoining States and I am certainly pleased to receive it.

I am enclosing herewith my check for \$2.00 to cover same and will you kindly sign the enclosed receipt and return in the self-addressed stamped (envelop) enclosed.

Yours very truly,

EARL D. WALLACE,

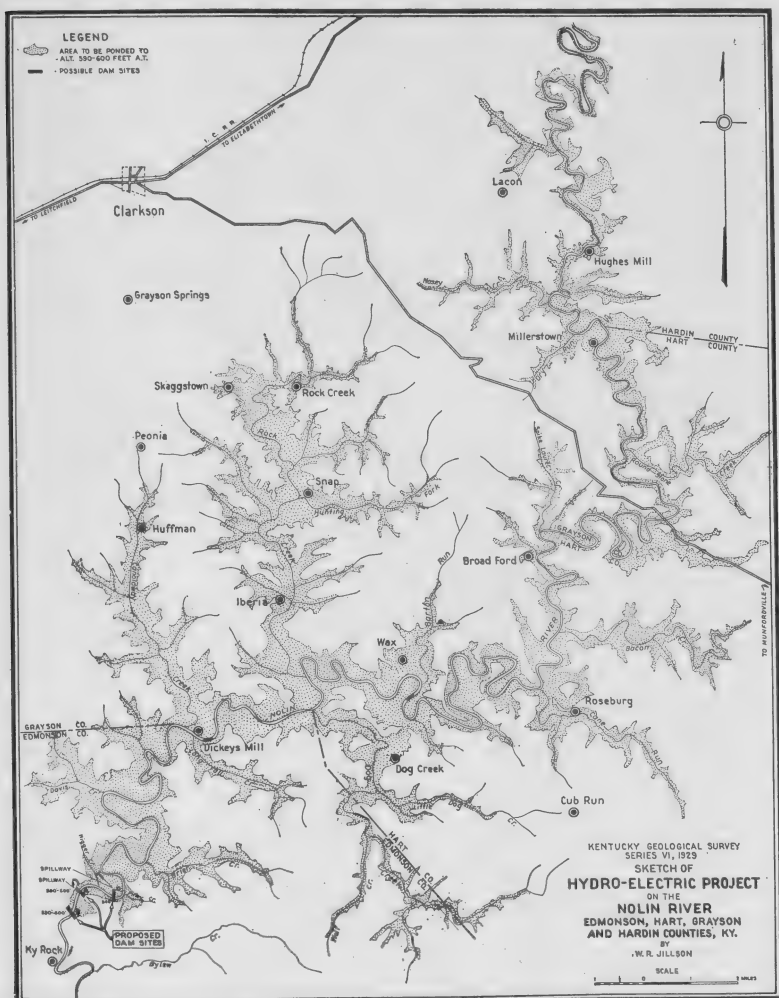
EDW:C

General Manager.

DISCOVERY OF FULLER'S EARTH

On September 17, 1929, the Director of the Kentucky Geological Survey announced in the daily press the discovery of commercially important quantities of Fuller's Earth in the Jackson Purchase region.

Fuller's Earth is a particular kind of clay used principally for industrial bleaching and rectifying of oils, particularly gasolines. Previous to this announcement, Fuller's Earth as a commercially important product had not been known to exist in Kentucky.



HYDRO PROJECT FOR NOLIN RIVER

Making use of a drainage basin of 677.5 square miles with a dam 150 feet high, the Director has calculated the availability here near Kyrock of 16,000 h. p. per second or 11,500 kw. per second. The proposed lake will cover at the maximum about 53 square miles.

Two type areas were studied by the Survey: (1) on the property of W. M. Coleman at Coleman's Cut about four miles south of Paducah in McCracken County, Kentucky, and (2) on W. L. Reeves property two miles southeast of Elva in Northwestern Marshall county. Both are within easy shipping dis-

tances by rail. The Coleman deposit adjoins the Illinois Central Railroad, while the Reeves deposit is on the N. C. & St. Louis Railroad. Each of these finds of Fuller's Earth occurs in the Porter's Creek clay, a Tertiary sediment; and each may be located on the Survey's new maps of McCracken and Marshall counties, Kentucky. Tests of selected representative samples of each of these deposits of Fuller's Earth follow:

KANSAS CITY TESTING LABORATORY (INC.)

Kansas City, Missouri

REPORT OF ANALYSIS

Kentucky Geological Survey,
Frankfort, Ky.

September 14, 1929

Laboratory No. 125297

Sample Marked—Clay from W. M. Coleman property, Southern McCracken County (7 miles south of Paducah), Kentucky.

ANALYSIS:

| | |
|--|---------|
| Moisture | 2.90 % |
| Loss on ignition | 7.85 % |
| Silica (SiO_2) | 66.50 % |
| Alumina (R_2O_3) | 20.48 % |
| (Iron [Fe] Trace) | |
| Lime (CaO) | 0.54 % |
| Magnesia (MgO) | 0.29 % |
| Sulphur (SO_3) | 0.00 % |

BLEACHING TESTS:

| | This Sample | Standard Clay |
|--|----------------|------------------|
| Gasoline: | | |
| Color of raw stock (Saybolt Number) .. | 0 | 0 |
| Color of treated stock | 18 | 19 |
| Color removed | 72 % | 75 % |
| Index of value | 96 | 100 |
| Lubricating Oil: | | |
| Color of raw stock | 4¾ | 4¾ |
| Color of treated stock | 2¼ | 4¼ |
| Color removed | 44 % | 100 % |

REMARKS

This clay is very effective for treating gasoline, but not Exceptionally good for bleaching lubricating oils.

Respectfully submitted,

KANSAS CITY TESTING LABORATORY,
By RAY CROSS

HOUSTON LABORATORIES
F. R. ROBERTSON, Ph. C.
215½ Main Street

CERTIFICATE OF ANALYSIS

Houston, Texas, 9-13-28

Kentucky Geological Survey,
Frankfort, Ky.

Sample of Fuller's Earth.

Received from 9-10-29

Marked (Series VI) Specimen: Clay-Fuller's Earth.

Locality: 2 miles southeast of Elva, Marshall County, Ky.

Collector: W. L. Reeves, on property of same.

Date: July 1, 1929.

Mineral Oil Bleach88% of Standard

Vegetable Oil Bleach82% of Standard

Palex No. 2 used as standard for mineral bleach—contact
method.

English Fuller's Earth used as standard for vegetable oil bleach.
Method of National Cotton Seed Products Association.

Respectfully submitted,

HOUSTON LABORATORIES

No. C-25816

Per F. R. Robertson.

EXHIBIT AT KENTUCKY STATE FAIR

At the request of the Commissioner of Agriculture, the Hon. Newton Bright, the Director of the Geological Survey had prepared during the Summer of 1928 a representative collection of Kentucky's minerals, ores and fossils for exhibition at the Kentucky State Fair. A double booth was set aside for this exhibit in the Merchants and Mechanics Building and the collection was arranged by the Director in a new glass and bronze cabinet especially designed for this purpose. An artistic wall and bench of Kentucky building stone was built along the aisle and large blocks of Kentucky coal, glacial boulders and other massive exhibits were suitably arranged and labeled on the floor. Finally the exhibit was completed by the addition of framed geological and relief maps of Kentucky.

During the two past Fairs—1928 and 1929—many thousands of people have stopped to examine this exhibit of the Survey and secure free leaflets descriptive of the State's geology and mineral resources, and its official publications relative to these subjects.



EXECUTIVE WING—OLD CAPITOL BUILDING

This view was taken Feb. 27, 1929, four days after the fire of Feb. 23, 1929. The present temporary roof had not then been completed.

BURNING OF OLD CAPITOL BUILDING

The most serious set back to the continued progress and expansion of the Kentucky Geological Survey during the past decade occurred in the form of a most destructive fire in the Old Capitol Building on February 23, 1929. From the time the first public alarm was given at about 1 o'clock in the morning of February 23rd until about 5 o'clock or a little before daylight the upper portion of the executive wing of the Old Capitol Building, erected in 1869, was a seething pit of fire of such proportions as to be for a considerable period, beyond the control of the combined fire fighting forces of the city of Frankfort and a large volunteer corps.

The fire was not discovered until flames had broken through the skylight in the roof and were mounting to the sky. By the time the city fire department arrived, the fire had so spread as to be beyond control. The morning was very cold which added a great handicap to insufficient pressure and volume at high points in the building which were involved by the flames. The Director of the Survey was called by friends from a sick bed to witness the conflagration at about one-thirty. Upon his arrival it was seen that the upper portion of the structure, occupied by the State Highway Department, and perhaps the entire building was doomed.

Although a ban had been placed by the police upon entering the building due to the advanced stage of the fire at this time, the Director secured permission to enter the offices of the Kentucky Geological Survey, which were situated on the first floor at the left of the Lewis Street entrance, to remove such records, manuscripts, etc., as were beyond price and without duplicates elsewhere. Once in the building it was found that the electric lighting system had broken down under the advance of the fire which at that time possessed the entire upper two and one-half stories of the building. No fire had entered the suite of offices occupied by the Kentucky Geological Survey though the rooms were smoke-filled and some water had already begun to drip from the ceiling at a number of points, particularly in the stock-room, where the Survey's numerous editions of Kentucky maps and reports were filed.

With the assistance of one or two volunteers all important

records were removed and housed in nearby dwellings, but no effort was made nor could any be made—so advanced was the fire—to remove the main properties of the Kentucky Geological Survey. By the time the papers and records above referenced had been safely removed and deposited on the East side of Lewis Street as above indicated, the upper walls of the building had begun to crash. With them many of the cornices were falling or about to fall in flames to the ground below making it unsafe for anyone to re-enter the building. Seriously ill with influenza and disheartened at the prospect which seemed certain to involve all of the Survey's property effects, the Director returned to his home at about 4:30 in order to secure a change of dry clothing. Instructions were left by him with friends to advise from time to time as to the progress of the conflagration.

Information was received at a little after 5 o'clock indicating that the lower half of the building would probably not burn. This news came not only as a great surprise but as a wonderful relief to the Director as well as to the thousands of interested citizens of Frankfort. Realizing that with the large amount of water and chemicals which had played upon the fire that the properties of the Survey were sure to be greatly damaged, the Director returned to the offices of the Survey shortly before 6 o'clock, having previously made arrangements with one of the plumbing houses of the city to send in a man to cut off the city mains in the basement, it being believed that these would have been opened by the fire and add to the flooding. The anticipated proved to be a fact, but although diligent service was rendered by the plumbers it was considerably past daylight before the building could be penetrated sufficiently to find the main cocks controlling the building's water system. Previous to this time the broken and disarranged plumbing of the upper two stories of the building had been flooding a very considerable amount of water into the central interior of the building with all of the uncontrolled pressure of the city system behind it.

Crews were immediately organized, tarpaulins were secured from the State Highway Department and the City Fire Department and the numerous cabinets of the Survey were speedily covered in so far as it was possible. Unfortunately much

of the shelving of the Survey in which bound publications were housed was so built as to make it impossible to cover fully with tarpaulins or any kind of watershed. In these files the damage to the Survey's property during the next several days and continuing for weeks afterwards was particularly severe. With the heating, lighting and water system of the building demolished, the erstwhile elegant offices of the Survey presented an appearance of abject desolation, which, coupled with a very low temperature, made the work of salvaging and cleaning up difficult and costly.

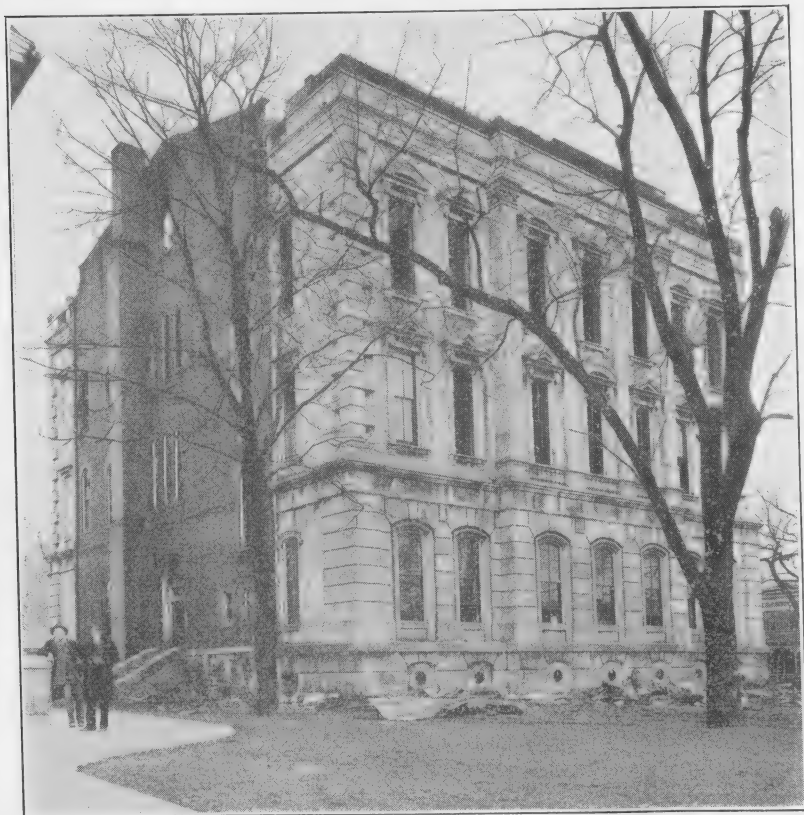
Throughout the day following, February 24th, and for several days thereafter water continued to flood the department: firstly in considerable quantities and latterly as occasional drips.



LEWIS STREET ENTRANCE TO OLD CAPITOL

This view shows plainly the complete destruction of the interior of the upper two floors. Note windows unbroken on the ground floor occupied by Kentucky Geological Survey.

In some places in the department, particularly the vault, the water did not cease to drip for upwards of two months, so thoroughly saturated were the massive sand, brick and stone walls and ceilings of the building. Investigation at this point showed that the original structure of the building had provided for a fire-proof ceiling above the first floor. This consisted of brick arches supported by steel "I" beams over which there had been laid a three or four inch layer of loose sand. It was this sand layer which gave the fire-proof character to the ceiling and resulted in keeping the fire above the first floor. And further on it was this same sand and brick structure which absorbed vast



REAR VIEW OF OLD CAPITOL BUILDING

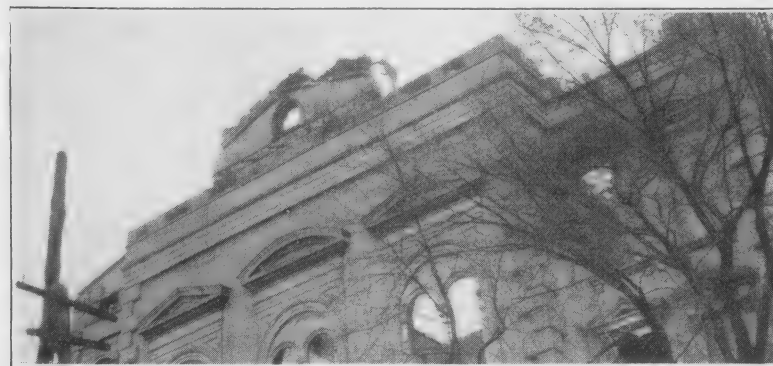
Although the executive wing which burned is close to the old capitol proper, against which Colonels Faris and Olive are standing, this priceless structure now over 100 years old, was undamaged by fire or water.

quantities of water and which continued to drip during the weeks which followed.

At no time either previous, during or subsequent to the conflagration was there any fire in the rooms occupied by the Kentucky Geological Survey, but these rooms were greatly affected by water damage.

About 6 o'clock in the morning of February 23rd when the flames were finally brought under complete control there was from two to three inches of water over the entire floor of the Survey's main office and upwards of eighteen inches of water on the basement floors.

Destructive and embarrassing as it was to the Survey, the fire did not in any way handicap the active function of this department to the public generally. At eight o'clock desks, typewriters, and office paraphernalia were removed from the burned executive wing to the old Capitol Building adjoining which had passed through the fire period unharmed. Here housed in one of the main rooms and the hallway of the State Historical Society, the office work of the Geological Survey was carried forward beginning at 8:30 o'clock Saturday morning, February 23rd, as usual.



REMOVING TOTTERING BRICK GABLE ON EAST END

Approval of the State Sinking Fund was immediately secured for the building of a temporary roof over the Survey's property so as to prevent any further damage by snow or rain. A large corps of convicts from the State Reformatory with others helped to remove the smoldering debris from the second

floor necessary to the completion of this work. Beginning on the Tuesday morning following, there having been no precipitation since the fire, the roof was undertaken under contract, by Messrs. Goins and Wright, and two-thirds of the building was completely covered by Saturday noon, March 2, 1929.

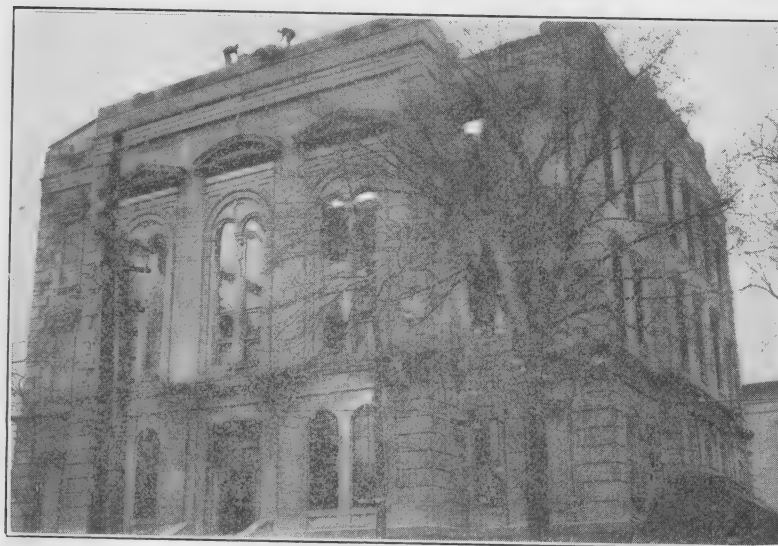


FALLING OF EAST END GABEL IN PROCESS

The removal of this and other unsafe walls was completed March 29, 1929.

From this point onward the work of rehabilitation of the Geological Survey had been carried forward up to the present time. Much money has necessarily been spent to maintain the functioning of the Survey and prevent increased losses to the property of the Commonwealth placed in the custody of the Kentucky Geological Survey.

In this work of salvaging many thousands of publications, books, maps and pamphlets, and other records thoroughly or partly saturated with water have had to be thrown away and the financial loss this entailed to the State and to the Kentucky Geological Survey has been very considerable, probably in the neighborhood of \$15,000.00 or \$20,000.00. A greater loss, unrecorded in money, is seen now in the wiping out of large stocks of maps and reports which had been prepared for the public and were and are in constant demand. These reports and maps have a distinct relationship to the progress and development of Kentucky, and should be rapidly replaced. Their loss constitutes an emergency which must address itself immediately to the Governor, the General Assembly, and the public at large.



LEWIS STREET FACADE AFTER THE FIRE

The remaining loose brick are in course of removal. View on March 29, 1929.

SEVENTY-FIFTH ANNIVERSARY OF THE GEOLOGICAL SURVEY

Kentucky points with pride to the fact that its Geological Survey as a state maintained institution has attained its seventy-fifth year. It is in fact one of the really old Geological Surveys of the United States and one of the oldest west of the Appalachian Mountains. Although the first official geological work in Kentucky was done by executive order in 1838 by Dr. William Williams Mather as a short summer reconnaissance, it was not until 1854 that a survey was fully organized and operated. In the three-quarters of a century that has elapsed, well over one hundred cloth bound volumes and half as many or more separate pamphlets have been issued on the geology and mineral resources of the State. Every county has been mapped, many in great detail so far as their geology is concerned. Other broad areas still remain to be covered. The sequence of official administration of the Survey follows.

The Kentucky Geological Survey 1854-1929 *Chronology*

DAVID DALE OWEN, M. D.
(1854-1857)

NATHANIEL SOUTHGATE SHALER, S. D.
(1873-1880)

JOHN ROBERT PROCTER
(1880-1892)

CHARLES JOSEPH NORWOOD, M. S.
(1904-1912)

JOSEPH BERNARD HOEING, C. E.
(1912-1918)

WILLARD ROUSE JILLSON, Sc. D.
(1919—)

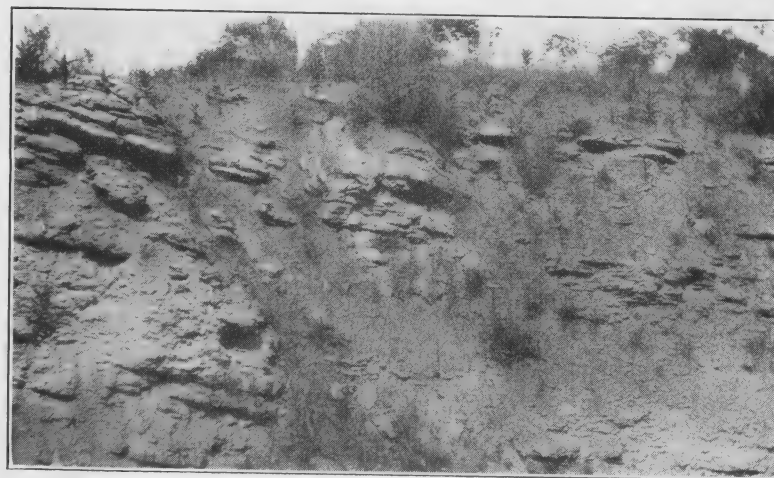


STREET ENTRANCE TO GEOLOGICAL SURVEY

Prior to the gathering of the geologists for the celebration of the Seventy-fifth Anniversary of the Kentucky Geological Survey in Frankfort, May 31, 1929, an electrically lighted sign was placed above the Lewis Street doorway to the burned old capitol building, executive wing.

THE FIELD TRIP OF THE OHIO-KENTUCKY ACADEMIES OF SCIENCE AND THE SEVENTY-FIFTH ANNIVERSARY OF THE KENTUCKY GEOLOGICAL SURVEY*

On May 30 and 31 and June 1, 1929, the geologists of the Kentucky and Ohio Academies of Science held a joint field trip in the State of Kentucky. Transportation was by automobile.



FAULTED ORDOVICIAN ROCKS NEAR AGAWAM STATION

The geologists taking part in the Bluegrass field trip visited this locality in Clark County May 30, 1929.

On the first day the Ordovician section at Agawam Station, Clark County, was studied under the guidance of Prof. A. C. McFarlan of the University of Kentucky and Prof. W. H. Shideler of Miami University, the party spending the night in Lexington. On May 31, the geologists, led by Prof. A. C. McFarlan and Prof. August F. Foerste of Dayton, Ohio, studied the High Bridge series at High Bridge; the sequence and faulting at Parksville in Boyle County; a barite prospect in one of the subsidiary faults of the Kentucky River at Burdett Knob, near Danville; and the sequence and structure at this locality. The night of the 31st was spent in Frankfort. On June 1 the party, led by Professors W. H. Bucher, of the University of Cincinnati, and August F. Foerste visited the crypto volcanic

* Charles H. Behre Jr., in Science p. 169., Aug. 16, 1929.

structure at Jephtha Knob in Shelby County, returning thence for lunch to the home of Dr. and Mrs. W. R. Jillson in Frankfort. Here the meeting adjourned.

On the night of Friday, May 31, the two Academies and their guests united with the staff of the State Survey in celebrating the seventy-fifth year of activity of the Kentucky Geological Survey. A dinner was held at the New Capitol Hotel, Frankfort, at which the visiting geologists were entertained as guests of the Survey. After a word of welcome from the Director of the Kentucky Geological Survey, Dr. W. R. Jillson, addresses were made as follows: Geology on the North of Kentucky (Dr. W. N. Logan, State Geologist of Indiana), Geology on the South of Kentucky (Dr. W. F. Pond, State Geologist of Tennessee), Mineral Resources and Industry (Dr. W. J. McCaughey of Ohio State University, speaking in place of Dr. J. A. Brownocker, the State Geologist of Ohio), Old Days of the Kentucky Survey (Dr. August F. Foerste of the Steele High School, Dayton, Ohio), Geology in Public Service (Dr. Nevin M. Fenneman, of the University of Cincinnati), Kentucky's Mineral Quickstep (the Hon. F. D. Sampson, Governor of Kentucky), and Reminiscences of Seventy-Five Years (Dr. A. M. Peter, Kentucky State Chemist and Secretary of the Kentucky Academy of Science). Congratulations were extended to the State Geologist and to the Survey in the presentation of flowers by the visiting geologists; a silver pitcher and goblets were given the State Geologist Dr. W. R. Jillson by the active and retired members of his staff, the presentation being made by Mr. Lucien Beckner of Louisville, Kentucky. Later the party visited the offices of the State Survey to see its map, mineral, and publication exhibits.

Present on the trip were representatives of the United States, Indiana, Kentucky, Ohio, and Tennessee Geological Surveys, of the Ohio Bureau of Soils, of three mineral-producing companies, and of thirteen universities, colleges, and schools, to wit: Antioch College, Denison University, University of Cincinnati, Indiana State University, University of Kentucky, Kenyon College, Miami University, University of Michigan, Ohio State University, Ohio Wesleyan University, Steele High School

of Dayton, (Ohio), Vanderbilt University, and Western Reserve University.

Special credit for the success of the trip is due to the energy and skill of Doctors A. C. McFarlan, August F. Foerste, W. H. Bucher, and W. H. Shideler, and Mr. Lucien Beckner, as well as to the hospitality of the Director of the Kentucky Geological Survey.

The complete list of those attending the 75th Anniversary (1854-1929) of the Kentucky Geological Survey, and the Kentucky-Ohio Academy Field Trip were:

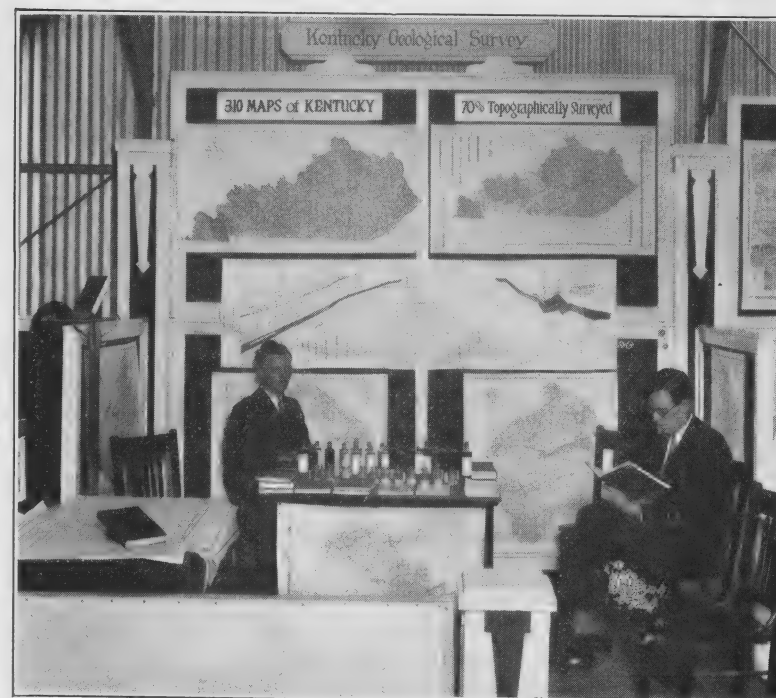
1. Bailey, W. F., Asst. State Geologist of Tennessee, Nashville, Tenn.
2. Beckner, Lucien, Consulting Geologist, Louisville, Ky.
3. Behre, C. H., Asst. Prof. of Geology, Univ. of Cincinnati, Cincinnati, Ohio.
4. Bird, Paul, Student, Ohio Wesleyan Univ., Delaware, Ohio.
5. Brand, Lulu, Assistant, Univ. of Cincinnati, Cincinnati, Ohio.
6. Bucher, W. H., Prof. of Geology, Univ. of Cincinnati, Cincinnati, Ohio.
7. Carman, J. E., Prof. of Geology, Ohio State Univ., Columbus, Ohio.
8. Conrey, G. W., Chief, Ohio Bur. of Soils, Wooster, Ohio.
9. Crist, Raymond, Consulting Geologist, Cincinnati, Ohio.
10. Dunn, P. H., Asst. Prof. of Geology, Miami Univ., Oxford, Ohio.
11. Dunn, Mrs. P. H., Oxford, Ohio.
12. Ehlers, G. M., Assoc. Prof. of Geology, Univ. of Mich., Ann Arbor, Mich.
13. Fenneman, N. M., Prof. of Geology, Univ. of Cincinnati, Cincinnati, Ohio.
14. Foerste, A. F., Professor, Steele High School, Dayton Ohio.
15. Gentry, H. L., Engineer, Louisville Gas & Elec. Co., Louisville, Ky.
16. Gentry, Mrs. H. L., Louisville, Ky.
17. Graham, W. A. P., Asst. Prof. of Geology, Ohio State Univ., Columbus, O.
18. Harrison, Mr., Topographic Engineer, U. S. Geol. Survey, Washington.
19. Hussey, R. C., Asst. Prof. of Geology, Univ. of Mich., Ann Arbor, Mich.
20. Hyde, J. E., Prof. of Geology, Western Reserve Univ., Cleveland, Ohio.
21. Hylton, Miss, Student, Ohio Wesleyan Univ., Delaware, Ohio.
22. Jillson, W. R., State Geologist of Kentucky, Frankfort, Ky.
23. Jillson, Mrs. W. R., Frankfort, Ky.
24. Laurence, Robert, Student, University of Cincinnati, Cincinnati, Ohio.

25. Lee, H. C., Student, Ohio State Univ., Columbus, Ohio.
26. Logan, W. N., State Geologist of Indiana, Ind. State Univ., Bloomington, Ind.
27. Lord, R. C., Prof. of Geology, Kenyon College, Gambier, Ohio.
28. McCann, F. F., Student, Denison Univ., Granville, Ohio.
29. McCaughey, W. J., Prof. of Mineralogy, Ohio State Univ., Columbus, Ohio.
30. McFarlan, A. C., Prof. of Geology, Univ. of Ky., Lexington, Ky.
31. Meacham, R. P., Instr. in Geology, Univ. of Ky., Lexington, Ky.
32. Mohr, Elizabeth, Student, Ohio State Univ., Columbus, Ohio.
33. Mueller, W. A., Asst. Prof. of Metallurgy, Ohio State Univ., Columbus, O.
34. Organ, James, Student, Univ. of Indiana, Bloomington, Ind.
35. Paris, F. G., Student, Ohio State Univ., Columbus, Ohio.
36. Peter, A. G., State Chemist (Retired), Lexington, Ky.
37. Pohl, E. R., Asst. Prof. of Geology, Vanderbilt Univ., Nashville, Tenn.
38. Pond, W. F., State Geologist of Tenn., Nashville, Tenn.
39. Robinson, L. C., Asst. Prof. of Geology, Univ. of Ky., Lexington, Ky.
40. Rouse, John, Student, Univ. of Cincinnati, Cincinnati, Ohio.
41. Shideler, W. H., Prof. of Geology, Miami Univ., Oxford, Ohio.
42. Stewart, Grace, Asst. Prof. of Geology, Ohio State Univ., Columbus, O.
43. Stockdale, Paris B., Instr. in Geology, Ohio State Univ., Columbus, Ohio.
44. Stonder, Ralph, Geologist, Louisville Gas & Elec. Co., Louisville, Ky.
45. Swinnerton, A. C., Prof. of Geology, Antioch College, Yellow Springs, Ohio.
46. Theis, C. V., Instr. in Geology, Univ. of Cincinnati, Cincinnati, Ohio.
47. Webb, W. R., Student, Kenyon College, Gambier Ohio.
48. Westgate, L. G., Prof. of Geology, Ohio Wesleyan Univ., Delaware, Ohio.
49. Williams, J. A., Student, Kenyon College, Gambier, Ohio.
50. Winston, Mattie, Student, Univ. of Cincinnati, Cincinnati, Ohio.

FUNCTIONS OF THE SURVEY

The Kentucky Geological Survey is one of the State's departments which has fundamentally to do with the economic progress and development of the Commonwealth. As an organization it finds function in three separate though related fields. The first of these and perhaps the most important is the examination of the geology and mineral resources of the Common-

wealth at various places throughout the State. This work is done by trained and experienced geologists, using as a base for their location the maps which have been made by the Geological survey separately and in cooperation with Federal Government. Reports are prepared and published for the public's

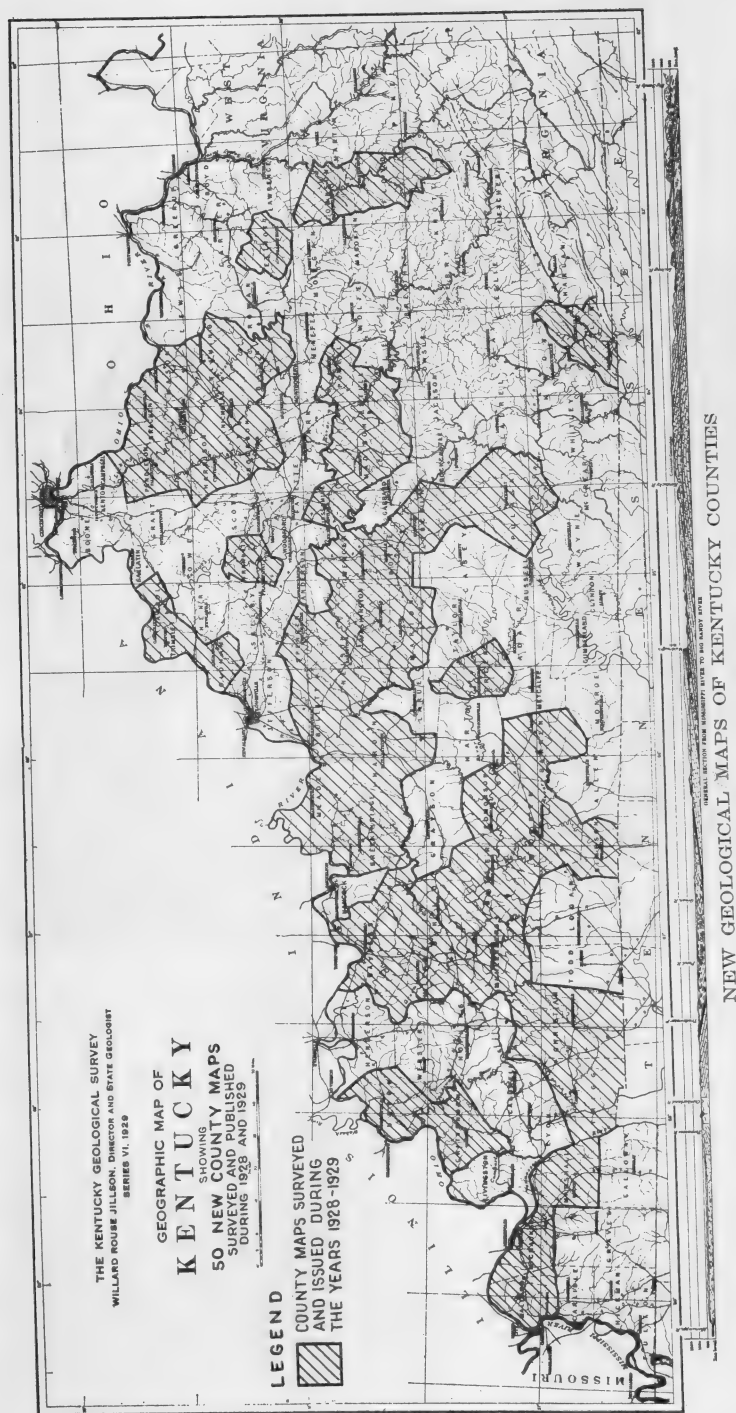


KENTUCKY BOOTH AT TUSA, 1929

A comprehensive exhibit of maps and reports pertaining to petroleum and natural gas in Kentucky was arranged by the Director at the International Oil Exposition at Tulsa, Oklahoma, October 5th to 12th, 1929. Much favorable attention to Kentucky was thereby secured.

benefit on coal, limestone, asphalt, oil and gas, flourspar and many other important minerals.

The second large field of scientific work carried on by the State's Geological Department is the base mapping of Kentucky which is done both by the State alone as in the making of county maps, say as for Todd, Nelson, or Menifee counties, or cooperatively with the U. S. Geological Survey as in the completion of the topographical base map of Kentucky. Topographical maps are simply hill and valley maps made very accurately



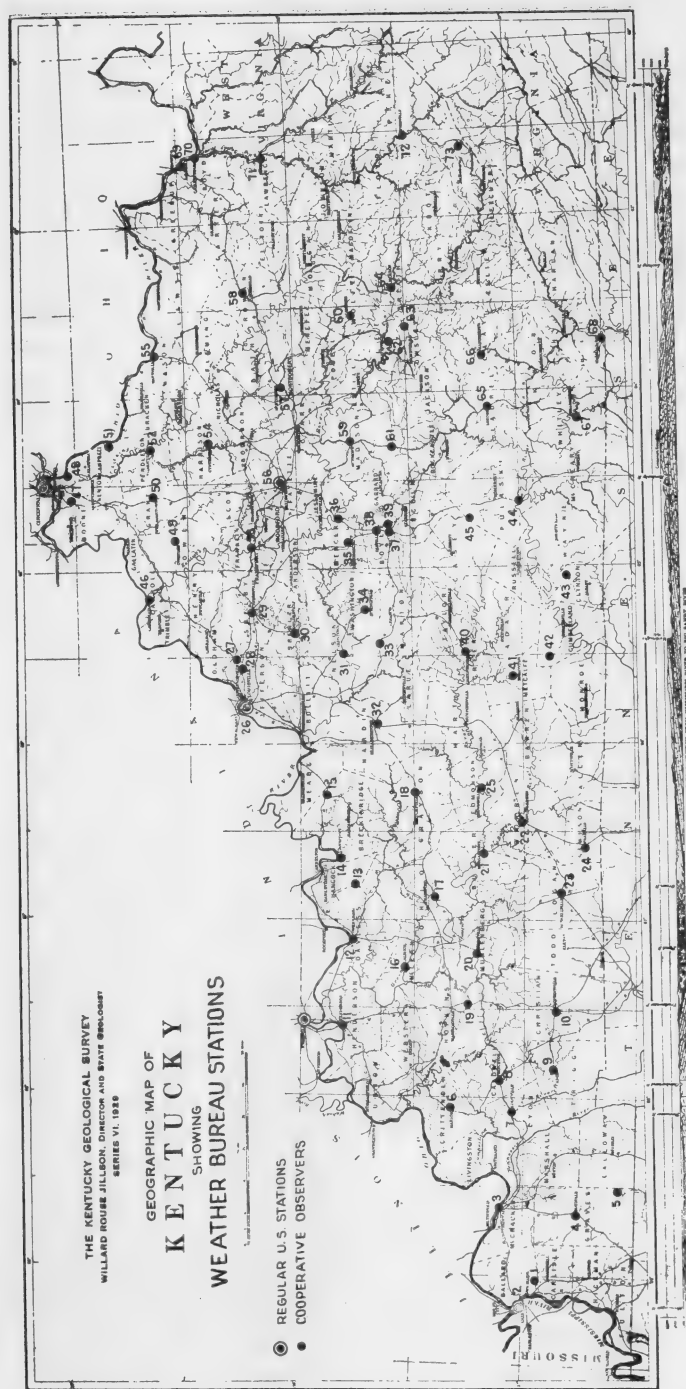
so that the elevations of all parts of the State so mapped are easily readable. They are used for a variety of purposes including highway construction, railroad construction, drainage work, and aviation as well as for geological investigations. Kentucky now has as a result of a continuous and active program during the last several years a map for every county, and about 70% of this Commonwealth is topographically base mapped.

The third field of service to Kentucky rendered by its Geological Survey is in the matter of advice to any taxpayer or corporation as to the probable or possible occurrence of the mineral resource of any particular locality within the Commonwealth. This service is carried on in response to inquiry by the State Geologist, Dr. W. R. Jillson. Through correspondence he endeavors to set out as perfectly as he is able the local conditions in a general way for those who may be interested. Added to this the State Geologist travels properly to all parts of Kentucky at various times, and gives talks on the occurrence and development of the State's mineral resources. The Geological Survey affords through these three branches of public service a great opportunity to anyone who would inform himself as to the abundant mineral wealth of Kentucky.

NEW KENTUCKY GEOLOGICAL MAPS

There are now available for general use forty-five new geological maps of Kentucky. These have been prepared at the scale of one inch equals one mile and on these all major stratigraphic divisions are shown in standard colors. Except as indicated below these detailed maps may be had at \$1.00 apiece. In orders totaling thirty or more a discount of ten percent will be allowed. Purchasers are requested remit to cover with order.

The following maps are now in course of distribution: Bath, Bourbon, Boyle, Bracken, Bullitt, Butler, Calloway, Christian, Crittenden, Cub Run Quadrangle, Daviess, Edmonson (\$1.50), Estill, Fleming, Franklin, Golconda, and Cave-in-Rock Quadrangle (\$1.50), Harrison, Hartford Quadrangle, Jessamine, Jephtha Knob, Lincoln, Madison, Marion, Marshall, Northern Hardin, McCracken, McLean, Mercer, Montgomery, Morehead Quadrangle, Muhlenberg, Nelson, Nicholas, Simpson, Spencer, Trimble, and Union.



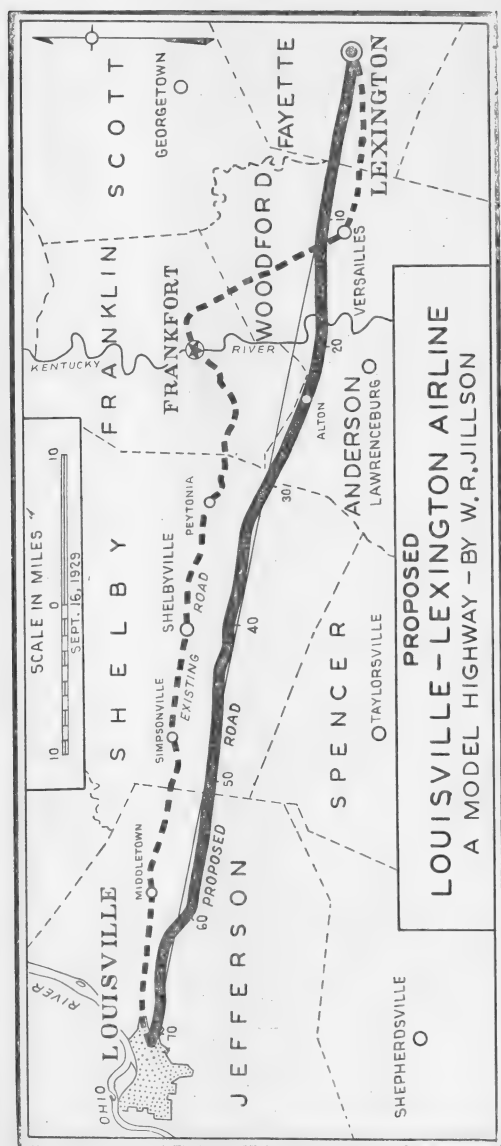
DISTRIBUTION OF WEATHER STATIONS IN KENTUCKY

The first detailed report on the climate of Kentucky, for all that has been said about it since the days of John Filson and his "Kentucke" of 1784, was issued by the Survey during 1929—the work of Professor S. S. Visser of Indiana. This and many other new and interesting maps appear in the new volume which is No. 31 of the Sixth Series.

COUNTIES OF KENTUCKY AND AREA OF EACH

During the past two years the program of surveying each county separately has been brought to a close with the completion of Washington County. This engineering work has revealed the surficial extent of each of the 120 counties which is given below to the public for the first time.

| County | Area Sq. Mi. | County | Area Sq. Mi. |
|--------------------|-----------------|------------------|-----------------|
| Adair | 427.5 | Gallatin | 103 |
| Allen | 274.5 | Garrard | 250.73 |
| Anderson | 199.2 | Grant | 268.41 |
| Ballard | 255.91 | Graves | 498.99 |
| Barren | 506.01 | Grayson | 537.40 |
| Bath | 294.43 | Green | 292.04 |
| Bell | 390 | Greenup | 355.83 |
| Boone | 250.2 | Hancock | 212.3 |
| Bourbon | 302.46 | Hardin | 155.44 |
| Boyd | 165.32 | Harlan | 484.56 |
| Boyle | 185.76 | Harrison | 311.76 |
| Bracken | 216.02 | Hart | 406 |
| Breathitt | 350.61 | Henderson | 459.8 |
| Breckenridge | 513.1 | Henry | 290.26 |
| Butler | 444.80 | Hickman | 213.63 |
| Bullitt | 312.42 | Hopkins | 556.5 |
| Caldwell | 358.61 | Jackson | 346.37 |
| Calloway | 372.15 | Jefferson | 387 |
| Campbell | 168.3 | Jessamine | 177.24 |
| Carlisle | 213.63 | Johnson | 268.40 |
| Carroll | 136.81 | Kenton | 167.5 |
| Carter | 413 | Knott | 344.3 |
| Casey | 460.6 | Knox | 377.5 |
| Christian | 680.84 | Larue | 269.6 |
| Clark | 266.40 | Laurel | 442.16 |
| Clay | 531.01 | Lawrence | 434.07 |
| Clinton | 235 | Lee | 209.28 |
| Crittenden | 396.34 | Leslie | 410.14 |
| Cumberland | 355.5 | Letcher | 349.77 |
| Daviess | 499.88 | Lewis | 491 |
| Edmonson | 340 | Lincoln | 321.85 |
| Elliott | 672 | Livingston | 344.50 |
| Estill | 261.16 | Logan | 555.7 |
| Fayette | 270.15 | Lyon | 266.36 |
| Fleming | 367 | McCracken | 264.38 |
| Floyd | 405.42 | McCreary | 453.2 |
| Franklin | 210.63 | McLean | 260.7 |
| Fulton | 209 | Madison | 440.25 |



COURSE OF PROPOSED LOUISVILLE-LEXINGTON AUTOMOBILE AIRLINE HIGHWAY

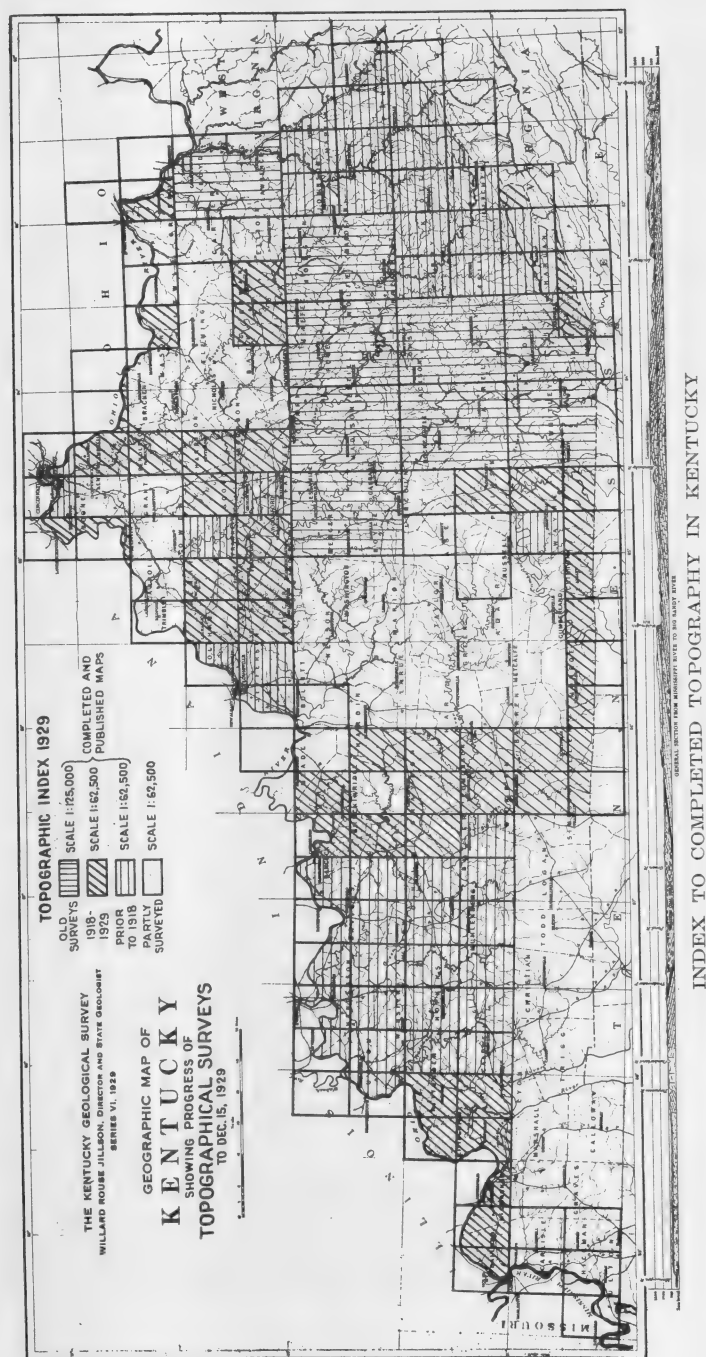
The route has been plotted by a competent engineer using new topographic maps and is declared to be practical as shown by heavy black line. It will save ten miles between the two cities. This project was undertaken by the Geological Survey, not with any thought of interloping into the affairs of the Highway Department, but simply as a public and graphic demonstration of the value of completing Kentucky's topographic base map.

| County | Area Sq. Mi. | County | Area Sq. Mi. |
|------------|-----------------|------------|-----------------|
| Magoffin | 311.5 | Powell | 192.25 |
| Marion | 346.6 | Pulaski | 675 |
| Marshall | 328.59 | Robertson | 106.73 |
| Martin | 236 | Rockcastle | 317.5 |
| Mason | 236.09 | Rowan | 273 |
| Meade | 322.56 | Russell | 285.8 |
| Menifee | 224.70 | Scott | 278.8 |
| Mercer | 260.21 | Shelby | 380.3 |
| Metcalfe | 306.8 | Simpson | 234.2 |
| Monroe | 364.5 | Spencer | 196.20 |
| Montgomery | 228.93 | Taylor | 359 |
| Morgan | 413 | Todd | 366.8 |
| Muhlenberg | 490.1 | Trigg | 462.01 |
| Nelson | 417.50 | Trimble | 158 |
| Nicholas | 202.69 | Union | 357.57 |
| Ohio | 620.77 | Warren | 551.43 |
| Oldham | 191 | Washington | 306.5 |
| Owen | 362.5 | Wayne | 478 |
| Owsley | 201.66 | Webster | 345.2 |
| Pendleton | 397.73 | Whitley | 467.25 |
| Perry | 357 | Wolfe | 205.26 |
| Pike | 806.4 | Woodford | 187.4 |

FIRST AIRLINE HIGHWAY PROPOSAL

Indicating by its construction and use an absolute annual saving to the public of \$275,000.00 and an amortization of all costs involved within about eight years, Dr. W. R. Jillson, State Geologist, released on September 21, 1929, a proposal for a new model Kentucky three-lane highway which he has named the "Louisville-Lexington Airline." This new automobile highway, exclusive of rights of way, will cost to grade, drain, bridge and surface with traffic bound macadam, it is estimated about \$2,750,000. It is planned to be thirty-three feet wide and is the first "three-way" road to be thoughtfully proposed for Kentucky.

Significant among the advantageous features of this proposed road are the following: (1) A saving of ten miles of distance between Louisville and Lexington. The present route via Shelbyville, Frankfort and Versailles is 80 miles; the new route is only 70 miles from city to city. (2) Reducing the driving time for the average motorist from three hours, to one



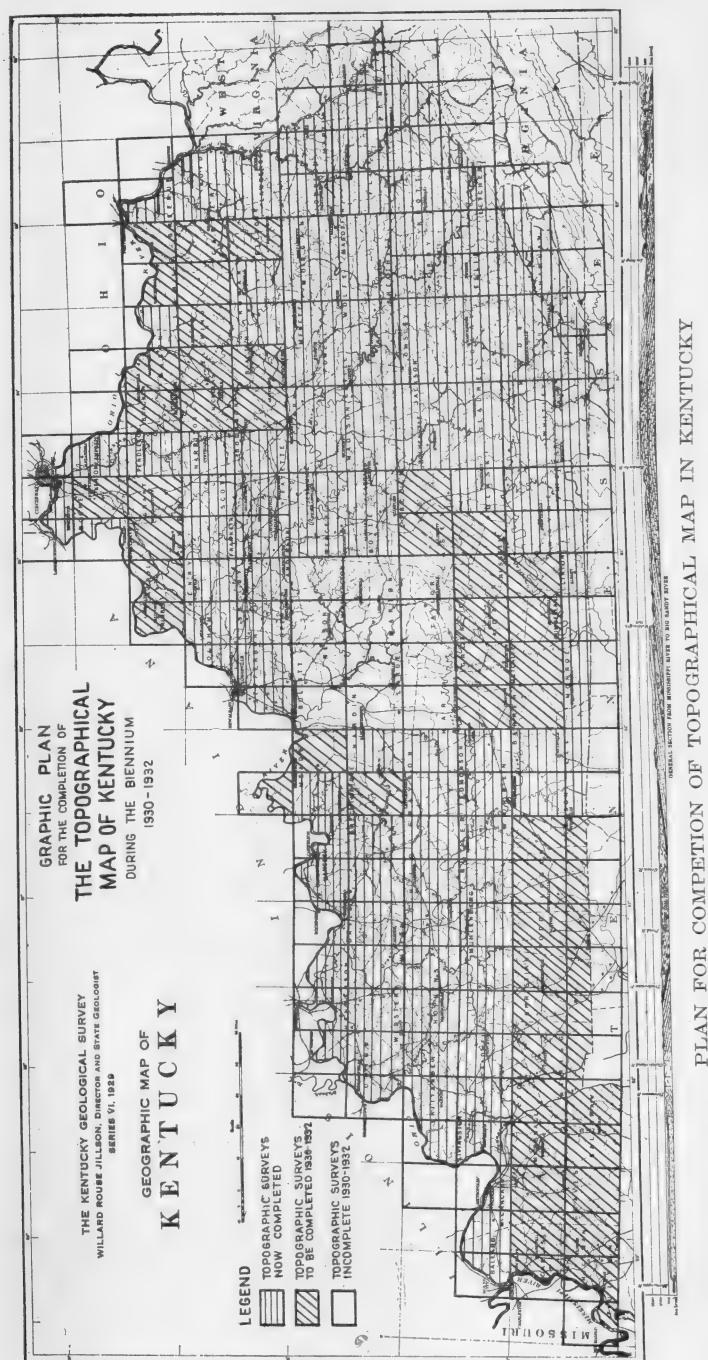
hour and 45 minutes—saving thereby one hour and 15 minutes between Lexington and Louisville. (3) Removing a very considerable and growing heavy shipping truck and tourist traffic from the narrow and congested streets of Shelbyville, Frankfort, Versailles and other small towns enroute.

At the present time by actual count there are about 1500 automobiles daily passing over the Louisville-Lexington portion of U. S. Route Number 60. The saving of 10 miles on each car gives a daily saving of 15,000 miles which at 5 cents a mile is \$750.00. As the traffic is rapidly increasing on this route the saving to the public in the first year of 365 days will be in excess of \$275,000.00. Since probably not less than 2000 cars a day will traverse this route within five years, the annual saving will so quickly increase as to retire the entire cost within about eight years.

The route proposed for the "Louisville-Lexington Airline" is indicated on the accompanying map. This route has been carefully located on new topographical maps by competent engineers, and it is affirmed that it can be built according to the best and most modern highway practice. The traffic bound features are to be covered with some permanent type of surface, possibly Kentucky Rock Asphalt or Portland Cement, at the end of a two or three year period when settling of cuts and fills has been completed. The route traverses five rich central Kentucky counties: Jefferson, Shelby, Anderson, Woodford and Fayette. Financing is proposed as a tri-party cooperation, the Federal Government $\frac{1}{3}$, the State $\frac{1}{3}$, and the five counties $\frac{1}{3}$. It is pointed out that all of the construction of the proposed Louisville-Lexington Airline Highway can be completed with detouring any of the regular traffic over the present U. S. 60. It is the best graphic argument for the immediate completion of Kentucky's topographic map now about 70% surveyed.

TOPOGRAPHICAL BASE MAPPING

Excellent results have been obtained in the field of topographical mapping during the past two years—1928 and 1929. Funds available for this purpose amounted, as is shown elsewhere in this report to \$150,000.00 annually. Of this amount the State of Kentucky provided one half or \$75,000.00 by allowance from the general revenues of the State Highway Depart-



ment in the two annual budget bills. This amount of money was made available for cooperative topographic mapping, "upon the advice and recommendation of the Governor." It was specified that it should be expended, "under the direction and supervision of the Director and State Geologist of the Geological Survey."

The annual appropriation of \$75,000.00 of State funds was matched upon the request of the State Geologist by the same amount of money by the Topographic Branch of the United States Geological Survey. With these funds in hand Kentucky advanced immediately from the position of a State of minor significance in the field of topographical activity to unquestioned leadership of the entire United States.

During the past two years a total of 4035 square miles of new topography scale 1:62,500 and contoured at twenty feet have been completed. Besides this 4400 square miles have been controlled preparatory to topographical sketching. The following sheets and part sheets—all 15 minute quadrangles—have been completed and a large number of these have been issued, at least in preliminary photolithographic form, and are in circulation.

As in the past these new topographic sheets have been located where they would serve to the best advantage the expanding program of the State Highway Department as well as the Geological Survey. The new topographic sheets are: Adolphus, Barthell, Burnside, Cannelton, Cynthiana, Eddyville, Falls of Rough, Falmouth, Felicity, Hardinsburg, Higginsport, LaCenter, Lafayette, Lawrenceburg, Morehead, Morning View, Pleasureville, Red Boiling Springs, Rising Sun, Sadieville, Salt Lick, Somerset, Spring Dale, and Sunnybrook.

With the closure of the topographical program in the field on December 15, 1929, the status of the work is now in a most satisfactory condition. The State of Kentucky is now about 70% surveyed topographically and a plan has been developed by the State Geologist, which if it can be materialized, will bring about the essential completion of the topographical base map in Kentucky during the next biennium. It has been computed that \$150,000.00 a year from the State matched by the same amount of Federal funds from Washington over a period of about two

years should complete the unmapped portion of Kentucky. The minimum sum required to do the work is set at \$600,000.00 half of which this State must provide. The United States Geological Survey has agreed to provide \$300,000.00 for this work during the next two years to match the State's appropriation. Every reason favors the acceptance of this liberal Federal cooperative offer, especially since the cost of the work will never be less and the demand for the unmapped sheets is continuing to increase. Practically all of the money will be spent for field work in Kentucky thus giving the people of the commonwealth every advantage in a direct way that may attach to the expenditure.

FEDERAL STATEMENT ON TOPOGRAPHIC WORK

Desiring a confirming statement from the United States Geological Survey, Topographic Branch, relative to the progress made during the past two years in this important cooperative work, the Director addressed a letter of inquiry to Washington after the close of field work on December 15, 1929. The following reply speaks for itself. It indicates an unsurpassed record of achievement in this very specialized field of mapping for the entire United States.

UNITED STATES
DEPARTMENT OF THE INTERIOR
Geological Survey
Washington

January 7, 1930.

Dr. W. R. Jillson,
State Geologist and Director,
Kentucky Geological Survey,
Frankfort, Ky.

My dear Doctor Jillson:

Confirming my wire of January 4, I hand you, herewith, a report in detail. 4,035 square miles, corrected to 4,042 square miles, have been completed between April 1928 and December 1929 on the following quadrangles:

| | | |
|------------|---------------------|--------------|
| Eddyville | Falls of Rough | Corydon |
| Big Clifty | Cannelton | Lawrenceburg |
| Lacenter | Sadieville | Sunnybrook |
| Burnside | Barthell | Cynthiana |
| LaGrange | Higginsport | Salt Lick |
| New Castle | Felicity | Falmouth |
| Lafayette | Morehead | Morning View |
| Adolphus | Hardinsburg | Springdale |
| Somerset | Red Boiling Springs | Rising Sun. |

Horizontal control has been completed in advance of the topographer on 4,400 square miles on the following quadrangles:

| | | |
|--------------|---------------|--------------|
| Garrison | Campbellsburg | Mayfield |
| Olive Hill | Bedford | Viola |
| Isonville | Creelsboro | Water Valley |
| Vanceburg | Jabez | Blandville |
| Walton | Vine Grove | Wickliffe |
| Rising Sun | Ekron | Hickman |
| Williamstown | Kirk | Bayouville. |

The control does not cover vertical control. This can be run at the same time the topographer is doing his work.

Very truly yours,

ALBERT PIKE,

Division Engineer in Charge,
Atlantic Division.

VALUE OF PHYSICAL PROPERTIES

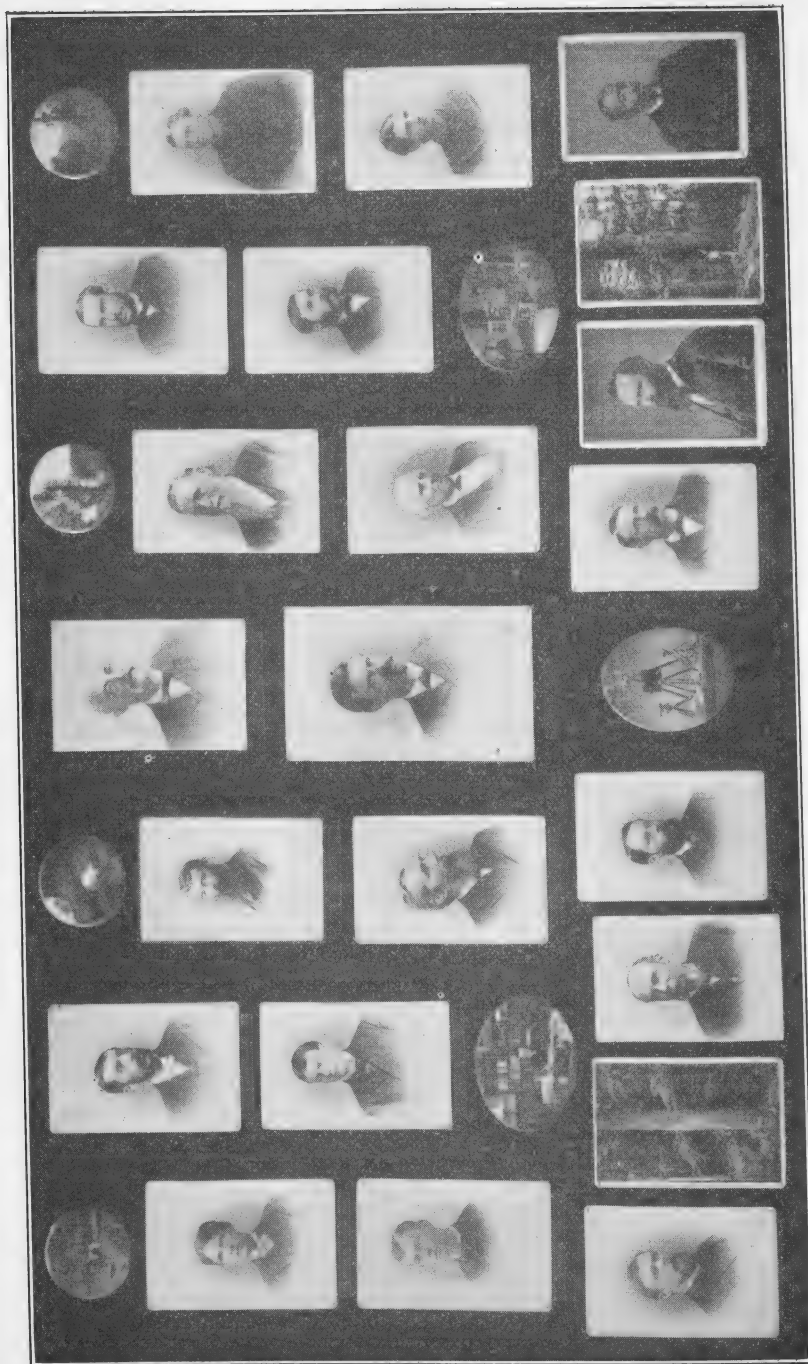
At the request of the State Auditor, the Director of the Kentucky Geological Survey has inventoried the physical properties of this state department and estimated their cost and value. These have been tabulated by groups and total \$99,000.00; the investment period as indicated below extending from 1920 to 1925 inclusive, except in the item of library, a portion of which is probably fifty years old.

ESTIMATES OF VALUES AND EXPENDITURES FOR IMPROVEMENTS AND PRINTING, KENTUCKY GEOLOGICAL SURVEY SINCE 1920-1929.

| | |
|---|-------------|
| Office furniture, including typewriters, etc. | \$2,650.00 |
| Instruments, field and drafting | 2,150.00 |
| Permanent improvements including stock filing devices, etc. | 7,500.00 |
| Mineral and fossil collections for cabinet | 9,500.00 |
| Reports, maps, publications, etc. | 62,200.00 |
| Kentucky Geol. Survey Library 13,885 vols., pamphlets and maps* | 15,000.00 |
| Total | \$99,000.00 |

LIBRARY AND STOCK DIVISIONS

For the first time in the history of the survey an exact count has been made of the books in the Survey's library and stock reserve as well as the private library of the Director, and the following totals



THE SECOND GEOLOGICAL SURVEY OF KENTUCKY
 Headed by John R. Procter, Director, this survey functioned from 1880 to 1892. This rare group picture was recently presented by a friend to the survey and is here reproduced to insure its preservation.

have been obtained. These two libraries taken together constitute the finest and most extensive geological literature source in the State of Kentucky.

| | Books | Pamphlets & Magazines |
|---|--------|-----------------------|
| Kentucky Geological Survey (Library) | 5,919 | 7,966 |
| Kentucky Geological Survey (In Stock) | 18,351 | 7,618 |
| Dr. Jillson's (Private Library) | 2,360 | 932 |

KENTUCKY—A NATIONAL MINERAL PRODUCER

Considering all of the States of the United States separately Kentucky stands eighth in the list of tabulated mineral values prepared by the U. S. Department of Mines. In 1916 Kentucky ranked ninth. Illinois as seventh now stands just ahead, while Ohio is sixth. Michigan is ninth and Kansas tenth. This classification is based on values obtaining during the year 1927.

STATES AND THEIR PRINCIPAL MINERAL PRODUCTS IN 1927*

| State | Rank | Percentage of total value for United States | Principal mineral products in order of value |
|-------------------------|------|---|---|
| Alabama | 16 | 1.60 | Coal, iron, ore, cement, clay products. |
| Alaska | 37 | .29 | Copper, gold, coal, silver. |
| Arizona | 14 | 2.05 | Copper, gold, silver, lead. |
| Arkansas | 20 | 1.21 | Petroleum, coal, natural gas, natural gasoline. |
| California | 3 | 9.37 | Petroleum, natural gasoline, natural gas, cement. |
| Colorado | 21 | 1.20 | Coal, gold, zinc, lead. |
| Connecticut | 40 | .15 | Stone, clay products, lime, sand and gravel. |
| Delaware | 50 | .01 | Clay products, stone, sand and gravel, greensand marl. |
| District of Columbia .. | 48 | .03 | Sand and gravel, clay products, sand-lime brick, stone. |
| Florida | 33 | .37 | Phosphate rock, stone, fuller's earth, sand and gravel. |
| Georgia | 34 | .34 | Stone, clay products, cement, fuller's earth. |
| Idaho | 27 | .60 | Lead, silver, zinc, stone. |
| Illinois | 7 | 3.68 | Coal, clay products, petroleum, cement. |
| Indiana | 12 | 2.19 | Coal, stone, cement, clay products. |
| Iowa | 26 | .68 | Coal, cement, gypsum, clay products. |
| Kansas | 10 | 2.46 | Petroleum, zinc, natural gas, cement. |
| Kentucky | 8 | 3.11 | Coal, petroleum, clay products, natural gas. |
| Louisiana | 23 | 1.05 | Petroleum, natural gas, natural gasoline, salt. |
| Maine | 42 | .11 | Stone, lime, clay products, slate. |
| Maryland | 32 | .42 | Coal, clay products, cement, sand and gravel. |
| Massachusetts | 35 | .33 | Stone, clay products, sand and gravel, lime. |

| State | Rank | Percent- age of total value for United States | Principal mineral products in order of value |
|----------------|------|---|---|
| Michigan | 9 | 2.53 | Iron ore, copper, cement, sand and gravel. |
| Minnesota | 13 | 2.10 | Iron ore, stone, cement, clay products. |
| Mississippi | 47 | .05 | Sand and gravel, clay products, natural gas, stone. |
| Missouri | 17 | 1.55 | Lead, clay products, cement, coal. |
| Montana | 19 | 1.39 | Copper, zinc, coal, petroleum. |
| Nebraska | 44 | .07 | Sand and gravel, cement, clay products, stone. |
| Nevada | 29 | .55 | Copper, gold, silver, gypsum. |
| New Hampshire | 45 | .07 | Stone, clay products, sand and gravel, feldspar. |
| New Jersey | 13 | 1.49 | Clay products, zinc, cement, stone. |
| New Mexico | 28 | .58 | Copper, coal, zinc, petroleum. |
| New York | 11 | 2.29 | Clay products, stone, cement, gypsum. |
| North Carolina | 38 | .24 | Stone, clay products, sand and gravel, copper. |
| North Dakota | 46 | .06 | Coal, sand and gravel, clay products, natural gas. |
| Ohio | 6 | 4.63 | Clay products, coal, natural gas, stone. |
| Oklahoma | 2 | 10.70 | Petroleum, natural gas, natural gasoline, zinc. |
| Oregon | 41 | .14 | Cement, stone, sand and gravel, clay products. |
| Pennsylvania | 1 | 19.11 | Coal, cement, clay products, natural gas. |
| Rhode Island | 49 | .03 | Stone, sand and gravel, clay products, lime. |
| South Carolina | 43 | .09 | Stone, clay products, sand and gravel barite. |
| South Dakota | 39 | .17 | Gold, cement, stone, sand and gravel. |
| Tennessee | 25 | .77 | Coal, cement, stone, clay products. |
| Texas | 4 | 7.64 | Petroleum, natural gas, sulphur, natural gasoline. |
| Utah | 15 | 1.84 | Copper, lead, coal, silver. |
| Vermont | 36 | .30 | Stone, slate, lime, talc. |
| Virginia | 24 | .84 | Coal, cement, clay products, stone. |
| Washington | 30 | .45 | Coal, cement, clay products, sand and gravel. |
| West Virginia | 5 | 7.48 | Coal, natural gas, petroleum, clay products. |
| Wisconsin | 31 | .44 | Stone, zinc, sand and gravel, iron ore. |
| Wyoming | 22 | 1.15 | Petroleum, coal, natural gas, natural gasoline. |

* From U. S. Bureau of Mines, Mineral Resources of the United States in 1928.

MINERAL PRODUCTS OF THE UNITED STATES AND PRINCIPAL PRODUCING STATES IN 1927*

| Rank in value | Product | Principal producing States ¹ | |
|---------------------|--------------------------------------|---|--|
| | | In order of quantity | In order of value |
| 18 | Aluminum | Not separable by States. | New York, North Carolina, Tennessee. |
| 37 | Antimonial lead | Montana, Utah | Not separable by States. |
| 56 | Arsenious oxide | Georgia, Arizona, Maryland | Rank same as for quantity. |
| 67 | Asbestos | Texas, Kentucky, Utah, Oklahoma | Arizona, Georgia, Maryland. |
| 30 | Native Asphalt: | Not separable by States. | Kentucky, Texas, Utah, Alabama. |
| 24 | Oil | Missouri, Georgia, Tennessee, California. | Not separable by States. |
| 41 | Barite (crude) | Arkansas, Georgia, Alabama | Rank same as for quantity. |
| 44 | Bauxite | Not separable by States. | Do. |
| 63 | Bismuth | California, Nevada | Not separable by States. |
| 36 | Borates | Wisconsin, Pennsylvania, Washington, | Rank same as for quantity. |
| 29 | Briquets, fuel | Oregon. | Wisconsin, Pennsylvania, Oregon, |
| 60 | Bromine | Michigan, California, Ohio, West Virginia | Washington. |
| 51 | Cadmium (metal and compounds) | Not separable by States. | Rank same as for quantity. |
| 42 | Calcium-magnesium-chloride (natural) | Michigan, California, Ohio, West Virginia | Not separable by States. |
| 6 | Cement | Michigan, California, Ohio, Indiana, | Michigan, California, West Virginia |
| 58 | Chats | Michigan. | Ohio. |
| 84 | Chromite | Missouri, Oklahoma, Kansas | Rank same as for quantity. |
| 4 | Clay products | California | Rank same as for quantity. |
| 25 | Clay, raw | Pennsylvania, Missouri, Ohio, New Jersey | Do. |
| 1 | Coal: | West Virginia, Pennsylvania, Kentucky, | Do. |
| | Bituminous | Illinois. | Ohio, Pennsylvania, New Jersey, |
| | Pennsylvania anthracite | Pennsylvania | Illinois. |
| 7 | Coke | Pennsylvania, Ohio, Indiana, Alabama | Pennsylvania, Missouri, Georgia, New |
| 86 | Columnar | South Dakota | Jersey. |
| 8 | Copper | Arizona, Utah, Montana, Michigan | Pennsylvania, West Virginia, Kentucky, |
| 46 | Diatomite and tripoli | California, Illinois, Oklahoma, Missouri | Illinois. |
| 83 | Emerald | New York, Virginia | Rank same as for quantity. |
| | | | Pennsylvania, Indiana, Ohio, New York. |
| | | | Rank same as for quantity. |
| | | | Do. |
| | | | Do. |

| Rank in value | Product | Principal producing States ¹ | |
|---------------|-----------------------------|--|--|
| | | In order of quantity | In order of value |
| 47 | Feldspar (crude) | North Carolina, Maine, New Hampshire, New York. | Do. |
| 15 | Ferro-alloys | Pennsylvania, New York, Ohio, Iowa. | Pennsylvania, New York, Ohio, Alabama |
| 78 | Flint lining for tube mills | South Dakota, Minnesota. | Rank same as for quantity. |
| 40 | Fluorspar | Kentucky, Illinois, Colorado, New Mexico. | Do. |
| 34 | Fuller's earth | Georgia, Florida, Nevada, Illinois. | Georgia, Florida, Illinois, Nevada. |
| 59 | Garnet, abrasive | New York, New Hampshire. | Rank same as for quantity. |
| (?) | Gems and precious stones | No canvass for 1927. | Rank same as for quantity. |
| 16 | Gold | California, South Dakota, Alaska, Colorado. | Alabama, Texas, Rhode Island, Michigan. |
| 70 | Graphite | Rhode Island, Nevada, Michigan. | Rhode Island, Michigan, Nevada. |
| | Amorphous | Alabama, Texas, California, Montana. | Rank same as for quantity. |
| 45 | Crystalline | Ohio, West Virginia, Michigan, Washington. | Do. |
| | Grindstones and pulpstones | New York, Iowa, Michigan, Texas. | New York, Iowa, Ohio, Michigan. |
| 17 | Gypsum | Minnesota, Michigan, Alabama, Pennsylvania. | Minnesota, Michigan, Alabama, New York. |
| 10 | Iron ore | Pennsylvania, Ohio, Illinois, Indiana. | Rank same as for quantity. |
| 3 | Iron, pig | Missouri, Utah, Idaho, Oklahoma. | Do. |
| 13 | Lead | Ohio, Pennsylvania, Missouri, West Virginia. | Ohio, Pennsylvania, Massachusetts, Missouri. |
| 19 | Lime | New Mexico, South Dakota, California, Maine. | Rank same as for quantity. |
| 76 | Lithium minerals | Washington, California. | Do. |
| 52 | Magnesite | Michigan, New York. | New York, Michigan. |
| 62 | Magnesium | Michigan, California. | Rank same as for quantity. |
| 53 | Magnesium salts (natural) | Montana, Arizona, Virginia, Idaho. | Montana, Virginia, Arkansas, Idaho. |
| 51 | Manganese ore | Minnesota, Wisconsin, New Mexico, Michigan. | Rank same as for quantity. |
| 31 | Manganiferous ore | New Jersey. | Do. |
| 65 | Manganiferous zinc residuum | Virginia, California, West Virginia, South Carolina. | |
| 73 | Marl | New Jersey, Texas, Delaware. | Do. |
| | Calcareous | California, Texas, Oregon, Washington. | Do. |
| 74 | Greensand | | Do. |
| 48 | Mercury | | Do. |

| | | | |
|-----|---|---|---|
| 63 | Mica | North Carolina, New Hampshire, South Dakota, New Mexico. | North Carolina, New Hampshire, South Dakota, Virginia. |
| | Scrap Sheet | New Hampshire, North Carolina, Virginia, Connecticut. | Rank same as for quantity. |
| 80 | Micaceous minerals | North Carolina, Georgia, Montana, Colorado. | North Carolina, New Hampshire, Virginia, Connecticut. |
| 79 | Millstones | Pennsylvania, Ohio, Illinois, Indiana. | Rank same as for quantity. |
| 22 | Mineral paints, zinc and lead pigments | No canvass for 1927. | New York, Virginia, New Hampshire, North Carolina. |
| (?) | Mineral waters | Colorado, New Mexico, Arizona. | Pennsylvania, Ohio, Indiana, Illinois. |
| 43 | Molybdenum | Oklahoma, Texas, California, Louisiana. | No canvass for 1927. |
| 5 | Natural gas | Oklahoma, California, Texas, West Virginia. | Rank same as for quantity. |
| 11 | Natural gasoline | Not separable by States. | West Virginia, California, Pennsylvania, Oklahoma. |
| 64 | Nickel | Ohio, Indiana, New Hampshire, Arkansas. | Rank same as for quantity. |
| 69 | Oilstones, etc. | No canvass for 1927. | California, Oklahoma, Texas, West Virginia. |
| (?) | Peat | Minnesota, California. | Not separable by States. |
| 82 | Pebbles for grinding | Oklahoma, Tennessee, Idaho, Wyoming. | Arkansas, Ohio, Indiana, New Hampshire. |
| 2 | Petroleum | California, Alaska, Oregon. | No canvass for 1927. |
| 27 | Phosphate rock | California, Maryland, Pennsylvania, Delaware, Kansas, Nebraska, California, New Mexico. | Rank same as for quantity. |
| 33 | Platinum and allied metals | Michigan, New York, Ohio, Kansas. | Do. |
| 33 | Potassium salts | New York, Illinois, Michigan, California, Wisconsin. | New York, Pennsylvania, Illinois, Ohio, Michigan, Massachusetts, New Jersey, Wisconsin. |
| 71 | Pumice | Not separable by States. | Not separable by States. |
| | Pyrites | California, Maryland, Delaware, Pennsylvania, Nebraska, California, Arizona. | California, Wisconsin, Maryland, North Carolina. |
| 55 | Salt | Rank same as for quantity. | |
| 23 | Sand | Do. | |
| 12 | Sand and gravel | New York, Pennsylvania, Illinois, Ohio, Michigan, Massachusetts, New Jersey, Wisconsin. | |
| 35 | Sand-lime brick | Not separable by States. | |
| 61 | Selenium | California, Maryland, North Carolina, Wisconsin. | |
| 72 | Silica (quartz) | West Virginia, New Jersey, Pennsylvania, Illinois. | West Virginia, Pennsylvania, Ohio, Illinois. |
| 50 | Silica sand and sandstone (finely ground) | Utah, Montana, Idaho, Arizona. | Rank same as for quantity. |
| 21 | Silver | California, Arizona, Wyoming, Nevada. | Pennsylvania, Vermont, New York, Virginia. |
| 26 | Slate | | California, Arizona, Wyoming, Washington. |
| 32 | Sodium salts (other than NaCl) natural sources. | | |

| Rank in value | Product | Principal producing States ¹ | |
|---------------------|---|---|--|
| | | In order of quantity | In order of value |
| 9 | Stone | Pennsylvania, Ohio, New York, Michigan | Indiana, Pennsylvania, New York, Ohio. |
| 20 | Sulphur | Texas, Louisiana, Utah, Nevada | Rank same as for quantity. |
| 28 | Sulphuric acid from copper and zinc smelters. | Tennessee, Illinois, Pennsylvania, Ohio. | Illinois, Tennessee, Pennsylvania, Ohio. |
| 38 | Talc and soapstone | New York, Vermont, Virginia, California. | New York, Virginia, Vermont, California. |
| 85 | Tellurium | Not separable by States. | Not separable by States. |
| 81 | Tin | Alaska, South Dakota | Rank same as for quantity. |
| 77 | Titanium ore: | California, Florida, Virginia | Florida, California, Virginia. |
| 75 | Ilmenite | Florida, Virginia | Rank same as for quantity. |
| 57 | Rutile | Nevada, Colorado, California, South Dakota. | Do. |
| 49 | Tungsten ore | Colorado, Utah | Do. |
| 14 | Uranium and vanadium ores. | Oklahoma, Kansas, New Jersey, Montana. | Do. |
| 66 | Zinc | Florida | Do. |
| 66 | Zircon | | |

¹ Rank of States in metal production (except aluminum, ferro-alloys, and pig iron) arranged according to mine reports, not smelter output.

² No canvass for 1927.

* From Mineral Resources of the United States in 1928. Katz and Clark, U. S. Bureau of Mines, Wash. 1929

** Estimated.

MINERAL RESOURCE PRODUCTION

During the last two years mineral resource production has been active in Kentucky, but there has been a slowing up of new development. This has been particularly true in coal, oil, natural gas, fluorspar and rock asphalt. Other materials such as building stones, clays, sands, gravels, etc., have had a slower, though steady, increase. The total yearly value of Kentucky's mineral resources and mineral products now is estimated to be about \$200,000,000.00, due to the fact that many minerals and mineral resources are not advanced for state or interstate commerce, compiled records show considerably less. It was estimated in the last report of this Survey that the 1927 mineral production would total about \$165,000,000.00. Actual computation shows it to have been \$167,086,186.00. It is now estimated that mineral production in 1929 will have a somewhat lessened value, possibly about \$150,000,000.00, but exact figures now are impossible to procure and may not be available until about June, 1930. Figures for 1927 and 1928 are given together with those of 1918 for purposes of comparison.

STATISTICAL SUMMARY OF KENTUCKY'S MINERAL RESOURCES¹

| Name | Calendar Year of 1918 | |
|--|-----------------------|------------------|
| | Volume | Value |
| Asphalt (native) | 3,167 | \$31,000.00 |
| Clay (raw) | 91,367 | 327,317.00 |
| Clay products | | 6,172,554.00 |
| Coal | 31,612,617 tons | 80,666,842.00 |
| Coke | 301,036 tons | 4,455,995.00 |
| Fluorspar | 87,604 tons | 2,069,185.00 |
| Gasoline (from natural gas) | 98,000 gal. | 13,000.00 |
| Lime | 1,884 tons | 14,925.00 |
| Natural Gas | 12,200,190 M. cu. ft. | 3,093,393.00 |
| Petroleum | 4,367,968 bbls. | 11,287,162.00 |
| Sand and Gravel | 818,471 tons | 557,548.00 |
| Stone (limestone and sandstone) | | 970,494.00 |
| Lead (galenite) | 255 tons | 21,066.00 |
| Zinc (carbonate) | 927 tons | 30,390.00 |
| Misc. (Abrasive, artificial gas, barite calcite, cement, mineral fertilizer, mineral water, and pig iron)..... | | 3,500,000.00 |
| Total | | \$113,210,871.00 |

Kentucky in 1918 was 11th in the United States and produced 1.6 of the 703,943,961 bbls. of oil produced in the United States.

Kentucky in 1918 was 23rd in stone industry in the United States.



GORGE OF TYGARTS CREEK

This remarkable photograph shows three complete meanders of the Carter County stream from the 'Hawk Nest' near Cascade Caverns.

STATISTICAL SUMMARY OF KENTUCKY'S MINERAL RESOURCES¹

Calendar Year of 1927

| Name | Volume | Value |
|---|-----------------------|------------------|
| Asphalt (natural rock) | 344,220 tons | \$3,156,700.00 |
| Carbon Black | 5,669,000 lbs. | 247,000.00 |
| Clay (raw) | 119,829 tons | 662,149.00 |
| Clay products | | 7,700,000.00 |
| Coal | 72,626,000 tons | 125,642,980.00 |
| Fluorspar | 57,495 tons | 1,040,338.00 |
| Gasoline (from natural gas) | 7,480,000 gals. | 547,000.00 |
| Iron (pig) | 184,851 tons | 3,445,289.00 |
| Lime | 6,862 tons | 47,620.00 |
| Natural gas | 17,000,000 M. cu. ft. | 5,200,000.00 |
| Petroleum | 6,628,110 bbls. | 10,315,276.00 |
| Sand and gravel | 3,002,311 tons | 1,718,055.00 |
| Stone (limestone & sandstone) | 2,603,770 tons | 2,863,779.00 |
| Misc. (Abrasive, artificial gas, barite, calcite, coke, gravel, lead, cement, mineral fertilizers, mineral waters zinc, minerals consumed in operation, etc.) | | 4,500,000.00 |
| Total | | \$167,086,186.00 |

STATISTICAL SUMMARY OF KENTUCKY'S MINERAL RESOURCES¹

Calendar Year of 1928

| Name | Volume | Value |
|--|------------------------|------------------|
| Asphalt (natural rock) | 292,777 tons | \$2,342,216.00 |
| Carbon Black | 484,000 lbs. | 24,000.00 |
| Clay (raw) | 120,000 tons | 663,000.00 |
| Clay products | | 7,217,991.00 |
| Coal* | 61,860,379 tons | 96,722,000.00 |
| Fluorspar | 69,747 tons | 1,426,766.00 |
| Gasoline (from natural gas) | 6,900,000 gals. | 544,000.00 |
| Hydro-electric Power | 290,000,000 K. W. hrs. | 730,000.00 |
| Iron (pig) | 225,545 tons | 4,398,127.00 |
| Natural gas | 18,750,000 M. cu. ft. | 6,000,000.00 |
| Petroleum | 7,301,089 bbls. | 11,208,022.00 |
| Sand and gravel | 2,100,907 tons | 1,589,617.00 |
| Stone (All grades) | 2,800,000 tons | 3,080,000.00 |
| Misc. (Abrasive, artificial gas, barite, calcite, coke, lead, cement, mineral fertilizers, mineral waters, zinc, and minerals consumed in operation and without sale | | 5,550,000.00 |
| Total | | \$141,495,739.00 |

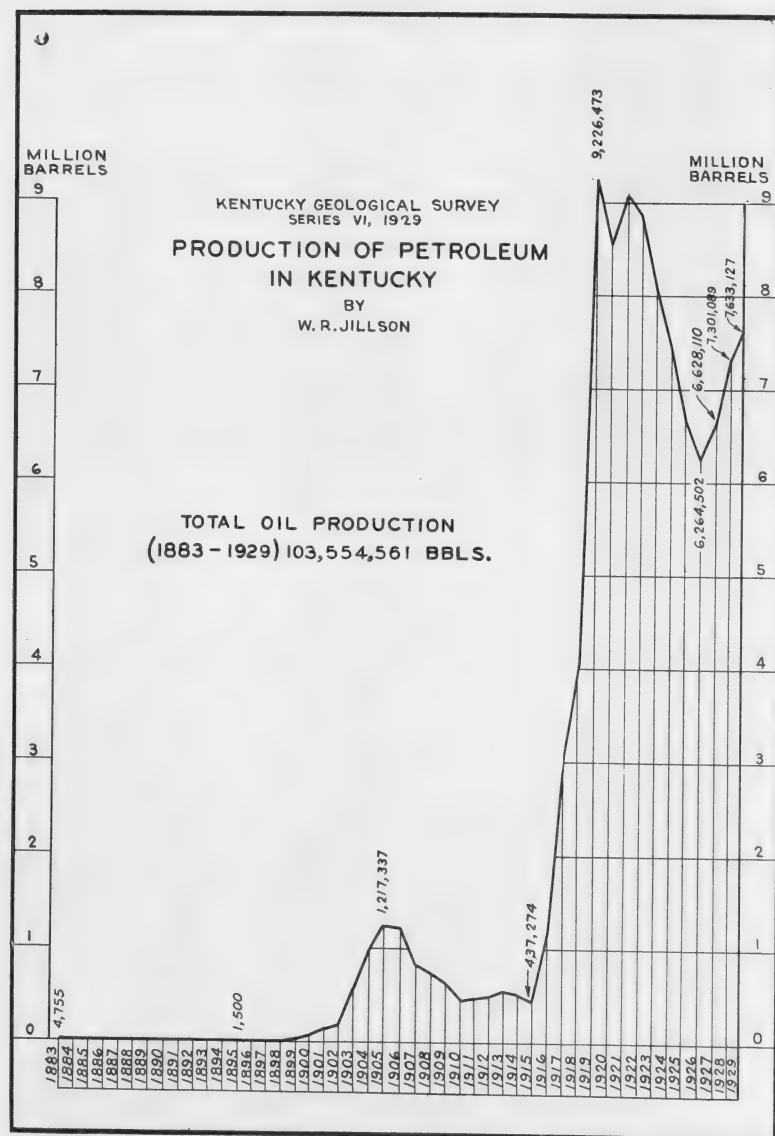
PRODUCTION OF PETROLEUM IN BARRELS IN KENTUCKY¹

From 1883 to 1928, inclusive

| Year | Bbls. |
|-----------|-------|
| 1883..... | 4,755 |
| 1884..... | 4,148 |
| 1885..... | 5,164 |
| 1886..... | 4,726 |
| 1887..... | 4,791 |
| 1888..... | 5,096 |
| 1889..... | 5,096 |
| 1890..... | 6,000 |
| 1891..... | 9,000 |
| 1892..... | 6,500 |
| 1893..... | 3,000 |
| 1894..... | 1,500 |
| 1895..... | 1,500 |

*U. S. Bureau of Mines.

¹All figures secured from U. S. Bureau of Mines and U. S. Dept. of Census except those for natural gas which are estimates of the writer.



| | |
|------|-----------|
| 1896 | 1,680 |
| 1897 | 322 |
| 1898 | 5,568 |
| 1899 | 18,280 |
| 1900 | 62,259 |
| 1901 | 137,259 |
| 1902 | 185,331 |
| 1903 | 554,286 |
| 1904 | 998,284 |
| 1905 | 1,217,337 |
| 1906 | 1,213,548 |
| 1907 | 820,844 |
| 1908 | 727,767 |
| 1909 | 639,016 |
| 1910 | 468,774 |
| 1911 | 472,458 |
| 1912 | 488,368 |
| 1913 | 526,568 |
| 1914 | 502,441 |
| 1915 | 437,274 |
| 1916 | 1,144,750 |
| 1917 | 3,088,160 |
| 1918 | 4,035,950 |
| 1919 | 9,226,437 |
| 1920 | 8,546,027 |
| 1921 | 9,080,845 |
| 1922 | 8,889,303 |
| 1923 | 8,087,250 |
| 1924 | 7,437,232 |
| 1925 | 6,658,803 |
| 1926 | 6,264,502 |
| 1927 | 6,628,110 |
| 1928 | 7,325,291 |

Total..... 95,945,636

PETROLEUM PRODUCTION—OHIO, DAVIESS AND HANCOCK
COUNTIES, KY.*

1922-1927

| | |
|------|--------------------|
| 1922 | 3,890.19 Bbls. |
| 1923 | 41,187.28 Bbls. |
| 1924 | 115,288.23 Bbls. |
| 1925 | 194,459.61 Bbls. |
| 1926 | 416,394.32 Bbls. |
| 1927 | 1,397,321.95 Bbls. |
| 1928 | 2,699,565.66 Bbls. |

Total 4,868,107.24 Bbls.

Hancock alone in 1922, Ohio and Hancock together in 1923 and 1924, and all these counties in 1925, 1926 and 1927.

The volume and value of a few of the outstanding minerals of Kentucky is given herewith:

COAL PRODUCTION IN KENTUCKY†

| | Volume | Value |
|------------|-----------------|-----------------|
| 1921 | 30,282,659 tons | \$81,460,352.00 |
| 1922 | 42,134,175 tons | 127,037,000.00 |
| 1923 | 43,149,962 tons | 113,542,000.00 |
| 1924 | 43,387,732 tons | 88,745,968.00 |
| 1925 | 54,689,932 tons | 89,404,450.00 |
| 1926 | 63,630,955 tons | 110,081,552.00 |
| 1927 | 72,626,000 tons | 125,642,980.00 |
| 1928 | 61,634,243 tons | 96,732,000.00 |

411,535,658 tons \$832,636,312.00

In coal produced Kentucky is now third in the United States.

OIL PRODUCTION IN KENTUCKY*

| | Volume | Value |
|------------|-----------------|-----------------|
| 1921 | 9,080,845 bbls. | \$33,556,241.00 |
| 1922 | 8,889,303 bbls. | 17,532,766.00 |
| 1923 | 8,087,250 bbls. | 15,189,916.00 |
| 1924 | 7,437,232 bbls. | 14,418,982.00 |
| 1925 | 6,658,803 bbls. | 15,290,167.00 |
| 1926 | 6,264,502 bbls. | 15,190,844.00 |
| 1927 | 6,628,110 bbls. | 10,315,276.00 |
| 1928 | 7,325,291 bbls. | 9,338,738.00 |

60,371,336 bbls. \$130,832,930.00

ROCK ASPHALT

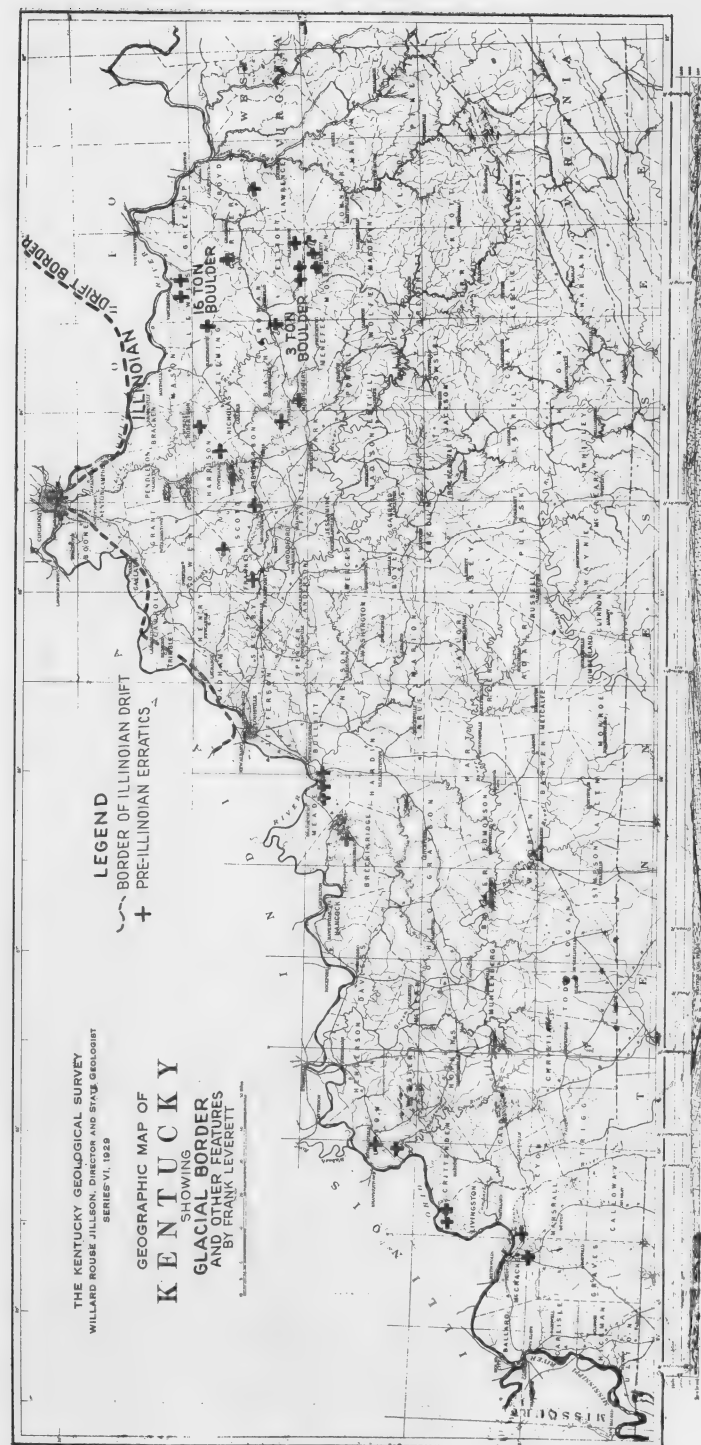
| | Tons | Value |
|------------|---------|----------------|
| 1923 | 139,401 | \$1,115,208.00 |
| 1924 | 245,929 | 1,967,932.00 |
| 1925 | 286,850 | 2,500,000.00 |
| 1926 | 320,430 | 2,530,480.00 |
| 1927 | 344,220 | 3,156,700.00 |
| 1928 | 292,777 | 2,342,216.00 |

1,629,607 \$13,612,536.00

In rock asphalt production Kentucky leads the United States.

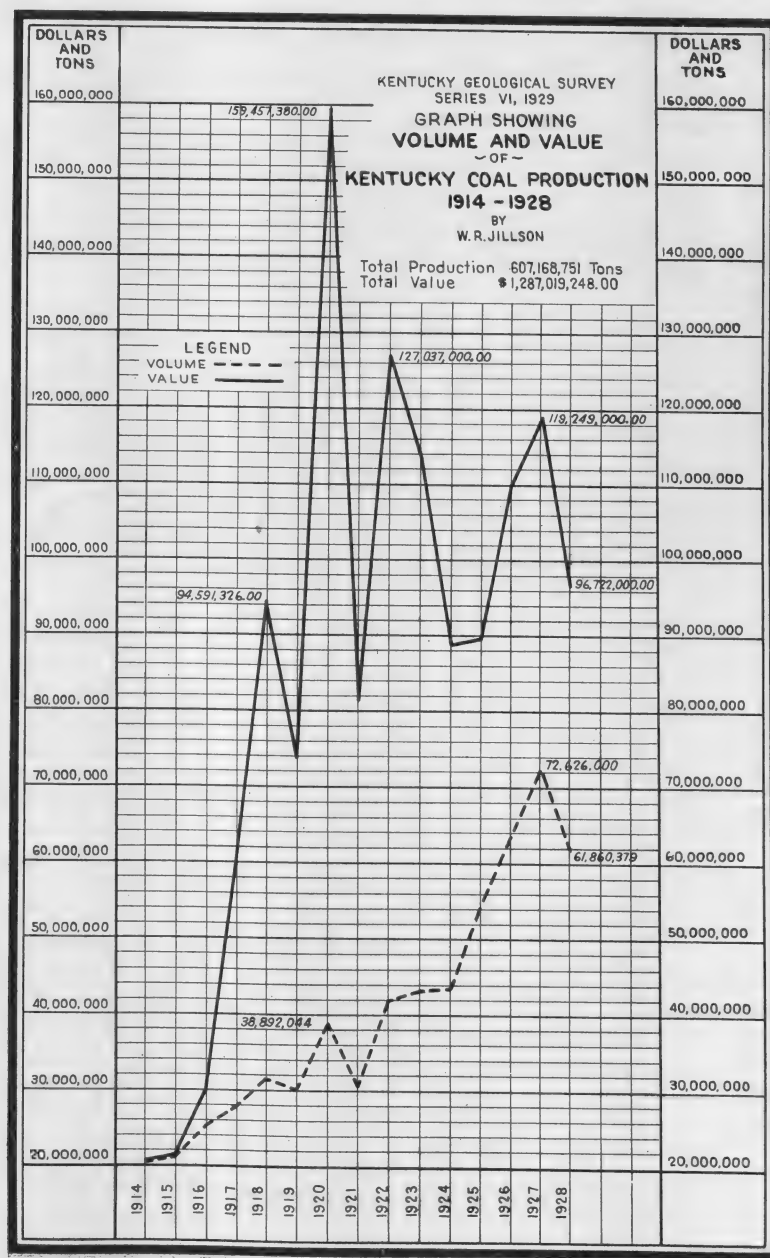
* Statistics compiled from Kentucky State Tax Commission Record.

† Statistics compiled from reports of State Inspector of Mines.



THE GLACIAL BORDER IN KENTUCKY

During the past year Professor Frank Leverett's report on the "Pleistocene of Northern Kentucky" has been published presenting this outline map. Pre-Illinoian erratics indicated as occurring in north central and north eastern Kentucky were discovered and described previously by the Director of the Survey.



UNOPERATED KENTUCKY ROCK ASPHALT

These asphaltic sandstones of Chester age are typical of many deposits in Grayson and adjoining counties of Western Kentucky that remain to be commercialized.

FLUORSPAR PRODUCTION IN KENTUCKY

| | Volume | Value |
|------|-----------------|----------------|
| 1921 | 18,670.11 tons | \$360,146.42 |
| 1922 | 63,322.20 tons | 1,170,194.25 |
| 1923 | 56,803.34 tons | 1,181,509.47 |
| 1924 | 46,728.07 tons | 965,869.20 |
| 1925 | 44,826.00 tons | 833,794.00 |
| 1926 | 62,495.00 tons | 1,167,129.00 |
| 1927 | 57,495.00 tons | 1,040,338.00 |
| 1928 | 71,840.00 tons | 1,365,000.00 |
| | 422,179.72 tons | \$8,083,980.34 |

In Fluorite production, Ca F₂, Kentucky leads the United States.

NATURAL GAS PRODUCTION IN KENTUCKY

| | M. Cu. Ft. | Value |
|-------|------------|----------------|
| | Volume | |
| 1921 | 4,820,000 | \$1,597,000.00 |
| 1922 | 5,872,000 | 1,879,000.00 |
| 1923 | 11,953,000 | 3,156,000.00 |
| 1924 | 12,875,000 | 3,432,000.00 |
| 1925* | 14,275,000 | 3,924,250.00 |

| | M. Cu. Ft. Volume | Value |
|--------|----------------------|-----------------|
| 1926** | 15,800,000 | 4,355,000.00 |
| 1927** | 17,000,000 | 5,200,000.00 |
| 1928** | 18,750,000 | 6,000,000.00 |
| | 101,345,000 | \$29,543,250.00 |

CLAY PRODUCTION IN KENTUCKY

| | Volume | Value |
|------|--------------|----------------|
| 1921 | 35,591 tons | \$204,400.00 |
| 1922 | 67,591 tons | 270,858.00 |
| 1923 | 102,195 tons | 428,021.00 |
| 1924 | 115,644 tons | 500,349.00 |
| 1925 | 121,917 tons | 548,015.00 |
| 1926 | 128,585 tons | 706,776.00 |
| 1927 | 119,829 tons | 662,149.00 |
| | 691,352 tons | \$3,320,568.00 |

CLAY PRODUCTS INDUSTRIES IN KENTUCKY*

(January 1, 1930)

BRICK AND TILE

| No. Schedule | Name and Address |
|-----------------|--|
| 1. | Alhambra Tile Co., 10th & Monroe Sts., Newport, Campbell County. |
| 2. | Alhorn & Waller Co., Uniontown, Union County; G. O. Morganfield, Ky. |
| 3. | North American Refractories Co., Inc., 701 Winchester Ave., Ashland. |
| 4. | North American Refractories Co., Inc., Hayward, Carter County, C. O. 701 Winchester Ave., Ashland. |
| 5. | Bannon, P., Pipe Co., 836 South 13th St., Louisville, Jefferson County. G. O. 13th and Breckenridge Sts. |
| 6. | Barbourville Brick Co., Barbourville, Knox County. |
| 7. | Broering & Meier, Delmar Place, Covington, Kenton County. |
| 8. | Busse Brick Co., The, Inc., 47th and L. & N. R. R., Covington, Kenton County. |
| 9. | Cambridge-Wheatley Co., 1601 Woodburn Ave., Covington, Kenton County. |
| 11. | Clark Mfg. Co., Plants 1 and 2, Route 3, Owensboro, Daviess County. |
| 12. | Clark Mfg. Co., R. R. 1, Ashbyburg, Hopkins County; C. O. R. 3, Owensboro. |

* From the State Inspector of Mines records.

** Estimated.

13. Coral Ridge Clay Products Co., Inc., Coral Ridge, Jefferson County.
14. Corbin Brick Co., Woodbine, Whitley County; C. O. Corbin, Ky.
15. Corhart Refractories Co., 16th and Lee Sts., Louisville, Jefferson County.
16. Dalton Bros. Brick Co., N. Elm St., Hopkinsville, Christian County.
19. General Refractories Co., Hitchins, Carter County; C. O. 106 16th Street, Philadelphia, Pa.
20. General Refractories Co., Olive Hill, Carter County; C. O. 106 16th St., Philadelphia, Pa.
21. Hall, John W., Brick Mfg., 538 Hall St., Madisonville, Hopkins County.
22. Harbison-Walker Refractories Co., Olive Hill, Carter County; J. O. Farmers Bank Bldg., Pittsburgh, Pa.



KENTUCKY GEOLOGICAL SURVEY BOOTH AT FAIR

At the suggestion of the Hon. Newton Bright, Commissioner of Agriculture, a permanent exhibit at the Kentucky State Fair at Louisville was prepared in 1928. Thousands of people have stopped to examine the specimens.

49. Hill-Karnes Brick Co., Inc., 900 N. 6th St., Paducah, McCracken County.
24. Kentucky Fire Brick Co., Haldeman, Rowan County.
26. Kleymeyer-Klutey Brick & Tile Works, Second St., Henderson, Henderson Co.
27. Lee Clay Products Co., Clearfield, Rowan County.
28. Louisville Fire Brick Works, Graham, Carter County; C. O. 4554 Louisville Ave., Louisville.

29. Louisville Fire Brick Co., 4554 Louisville Ave., Louisville, Jefferson County.
31. Wickersham, K. B., Box 333, Fulton Road, Mayfield, Graves County.
32. Maysville Brick Co., Maysville, Mason County.
33. Murray Tile Co., Cloverport, Breckenridge County.
34. Owensboro Clay Products Co., Inc., Box 255, Owensboro, Daviess County. (Plant location—Route No. 8.)
35. Owensboro Sewer Pipe Co., Owensboro, Daviess County.
36. Paducah Brick & Tile Co., 1439 So. 10th St., Paducah, McCracken County.
37. Paducah Tile & Pottery Co., 604 No. 7th St., Paducah, McCracken County.
38. Peebles Ceramic Products Co., Firebrick, Lewis County; C. O. Box 1001, Portsmouth, O.
44. Southern Brick & Tile Co., Inc., Whitmer, Jefferson County; C. O. 13th and Ormsby Sts., Louisville.
45. Sphar Brick Co., Inc., Maysville, Mason County.
46. Stanton Brick Co., Stanton, Powell County; G. O. Lexington, Ky.
47. Taylor Sons Co., Chas., Taylor, Greenup County; C. O. 706 Burns St. Cincinnati.
48. West Point Brick Co., West Point, Hardin County.

Idle and Out of Business

10. Carrollton Brick Co., 2nd & Clay Sts., Carrollton, Carroll County, Idle.
17. Fayette Brick Corporation, Route 9, Liberty Pike, Lexington, Fayette Co. Idle.
25. Kentucky Refractories Co., Russell, Greenup County. Idle.
40. Providence Brick Co., Providence, Webster County. O. B.
41. Quinn-Win Brick Co., Sturgis, Union County. Idle.
42. Richmond Brick & Tile Works, Richmond, Madison County. Idle.
18. Gates, J. J., 30th & Carter Ave., Ashland Boyd County. Idle.
23. Hill & Sons, W. M., Fulton, Fulton Co. Idle.

KENTUCKY—POTTERY

1. Bell City Pottery Co., Bell City, Graves County; G. O. R. No. 1, Farmington.
2. Bybee Pottery Co., E. Seventh St., Lexington, Fayette County.
3. Louisville Pottery Co., Inc., Floyd & Bloom Sts., Louisville, Jefferson Co.
4. Pottertown Pottery, Pottertown, Callaway County; G. O.—R. F. D., Almo, Ky.
30. Madisonville Tile Co., Madisonville, Hopkins Co. Idle.
39. Progress Press Brick Co., Poplar Levil Rd. and Clark Lane, Louisville, Jefferson Co. Idle.

* List prepared by the Bureau of Census, U. S. Dept. of Commerce.

43. Schneider & Sons, A. H., Box 504, Nicholasville, Jessamine Co. Idle.

OFFICE WORK OF THE SURVEY

The office routine of the Kentucky Geological Survey has been carried forward during the past biennium by a small staff of three regular or full-time employees, including the State Geologist. The statutes do not provide for an Assistant State Geologist, and for this reason the burden of a very considerable general correspondence service to the people of the State is carried by the Director of the Survey. During the two-year period covered by this report, a total of 17,154 letters have been received, or an average of 31 per day. In reply 16,440 have been sent, giving an average of 29 per day. The smaller number of letters sent out as compared to those received is accounted for by the fact that a portion of the correspondence calls for certain reports and maps and does not require other official reply. A detailed statement by months is given in the following statement:

CORRESPONDENCE THROUGH U. S. POST OFFICE AT FRANKFORT, KY., FOR THE TWO FISCAL YEARS

July 1st, 1927, to June 30, 1929

| Year | Month | Letters Received | Letters Sent |
|----------------------------|-----------------|------------------|--------------|
| 1927 | July | 623 | 750 |
| | August | 600 | 760 |
| | September | 643 | 608 |
| | October | 682 | 585 |
| | November | 816 | 789 |
| | December | 840 | 835 |
| 1928 | January | 821 | 687 |
| | February | 780 | 829 |
| | March | 844 | 776 |
| | April | 922 | 870 |
| | May | 693 | 671 |
| | June | 640 | 537 |
| Total July 1, 1927, to | | | |
| June 30th, 1928, inclusive | | 8,904 | 8,697 |
| 1928 | July | 616 | 499 |
| | August | 643 | 707 |
| | September | 682 | 646 |
| | October | 732 | 763 |
| | November | 658 | 676 |

| Year | Month | Letters Received | Letters Sent |
|--|----------------|------------------|--------------|
| 1929 | December | 621 | 523 |
| | January | 746 | 577 |
| | February | 658 | 644 |
| | March | 707 | 562 |
| | April | 843 | 785 |
| | May | 763 | 750 |
| | June | 581 | 611 |
| Total July 1, 1928, to June 30, 1928, inclusive | | 8,250 | 7,743 |
| Grand total for two fiscal years ending June 30, 1929 | | 17,154 | 16,440 |
| Daily average | | 31 letters | 29 letters |

One of the chief activities of the Kentucky Geological Survey is the furnishing of detailed and accurate geological and scientific information concerning the geology, mineral and natural resources of Kentucky. In this state, and international service during the past biennial period 35,258 geological reports and maps, an average of 64 per day, have been sent from this office in response to written or personal orders accompanied by specified remittances as required by law as shown by the following statement:

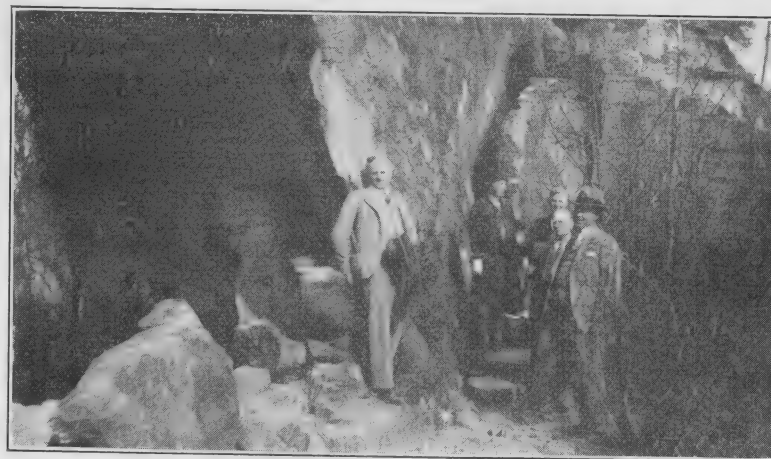
KENTUCKY GEOLOGICAL SURVEY PUBLICATIONS DISTRIBUTED BY REQUEST

July 1st, 1927, to June 30th, 1928, inclusive

| Year | Month | No. Mailed | Carried Away | Total |
|-----------------------------------|-----------------|------------|--------------|--------|
| 1927 | July | 1,375 | 154 | 1,529 |
| | August | 1,080 | 105 | 1,185 |
| | September | 1,193 | 1,199 | 2,392 |
| | October | 1,238 | 123 | 1,361 |
| | November | 940 | 125 | 1,065 |
| | December | 1,204 | 130 | 1,334 |
| 1928 | January | 1,270 | 451 | 1,721 |
| | February | 1,609 | 600 | 2,209 |
| | March | 1,299 | 163 | 1,462 |
| | April | 2,138 | 121 | 2,259 |
| | May | 965 | 244 | 1,209 |
| | June | 1,411 | 297 | 1,708 |
| | | 15,722 | 3,712 | 19,434 |
| Total for fiscal year, 1928 | | | | 19,434 |

July 1st, 1928, to June 30, 1929, inclusive

| Year | Month | No. Mailed | Carried Away | Total |
|--|-----------------|------------|--------------|--------|
| 1928 | July | 1,232 | 105 | 1,337 |
| | August | 1,067 | 147 | 1,214 |
| | September | 1,219 | 267 | 1,486 |
| | October | 814 | 174 | 988 |
| | November | 830 | 176 | 1,006 |
| | December | 1,018 | 813 | 1,831 |
| 1929 | January | 819 | 100 | 919 |
| | February | 497 | 285 | 782 |
| | March | 1,247 | 115 | 1,326 |
| | April | 1,166 | 120 | 1,286 |
| | May | 842 | 466 | 1,308 |
| | June | 1,655 | 650 | 2,305 |
| | | 12,406 | 3,418 | 15,824 |
| Total for fiscal year, 1929 | | | | 15,824 |
| Grand total for two fiscal years | | | | 35,258 |
| Daily average | | | | 64 |



NATURAL BRIDGE PARK ON RED RIVER

Lead by Governor F. D. Sampson, Chairman, the Kentucky State Park Commission, of which the State Geologist is a member, early in 1928, visited this very unusual arch of Pottsville conglomerate in Powell County. As a result of this inspection a number of important improvements were made at this State Park.

RECEIPTS FOR POSTAGE FOR BIENNium

First Fiscal Year

July 1, 1927, to June 30th, 1928, inclusive

| | | |
|------|--------------|---------|
| 1927 | July | \$90.00 |
| | August | 89.00 |

| | | | |
|------|-----------------|--------|----------|
| | September | 60.00 | |
| | October | 50.00 | |
| | November | 10.00 | |
| | December | 15.00 | |
| 1928 | January | 60.00 | |
| | February | 80.00 | |
| | March | 70.00 | |
| | April | 112.50 | |
| | May | 35.00 | |
| | June | 20.00 | |
| | Total | | \$691.50 |

SECOND FISCAL YEAR

July 1, 1928, to June 30th, 1929, inclusive.

| | | | |
|------|-----------------|---------|----------|
| 1928 | July | \$55.00 | |
| | August | 55.00 | |
| | September | 62.00 | |
| | October | 45.00 | |
| | November | 60.00 | |
| | December | 66.00 | |
| 1929 | January | 53.00 | |
| | February | 30.00 | |
| | March | 25.00 | |
| | April | 70.00 | |
| | May | 30.00 | |
| | June | 46.50 | |
| | Total | | \$597.50 |



FOSSIL OF CARBONIFEROUS TREE

This specimen collected by the Survey from the Cypress (Mississippian) sandstone of Breckinridge County, Ky., is now on exhibit in the offices of the Geological Survey.

CREDITS AND EXPENDITURES OF THE
KENTUCKY GEOLOGICAL SURVEY*

| Fiscal Year Ending June 30th, | 1928 | 1929 | |
|--------------------------------------|-------------|----------------------|--------------|
| | RECEIPTS | STATE APPROPRIATIONS | EXPENDITURES |
| Salaries and Maintenance | \$40,000.00 | | |
| Base Mapping, etc. (Special) | 17,000.00 | | |
| | \$57,000.00 | \$57,000.00 | |
| Sale of Publications | 4,456.41 | | |
| Insurance—Fire | | | |
| Expenditures: | | | |
| Expenditures—Salaries | | | \$31,835.34 |
| Traveling Expenses | | | 5,962.70 |
| Printing | | | 15,351.38 |
| Office Supplies | | | 598.92 |
| Maps | | | 3,514.76 |
| Permanent Improvements | | | 858.83 |
| Office Furniture and Equipment | | | 2,032.60 |
| Books | | | 570.54 |
| Telephone and Telegraph | | | 528.24 |
| Freight and Express | | | 196.14 |
| Collectors of Fossils, etc. | | | |
| New Typewriters, etc. | | | |
| Totals | 61,546.41 | 57,000.00 | \$61,449.45 |

*Prepared by the State Inspector and Examiner.

CO-OPERATIVE TOPOGRAPHICAL SURVEY

(State Road Department Funds, Budget of 1928-1929.)

| | |
|--|--------------|
| Appropriations, April 1, 1928-March 31, 1930 | \$150,000.00 |
| Total expenditures to Jan. 10, 1930 | \$143,489.49 |

| | |
|--|------------|
| Balance unexpended, Jan. 10, 1930..... | \$6,510.51 |
|--|------------|

As shown by vouchers in the Auditor's office none of the appropriation for Topographical Mapping was used directly or indirectly for the use and benefit of the Kentucky Geological Survey.

R. T. COGHILL,

Bookkeeper State Highway Accts.,

State Auditor's Office

January 11, 1930.

INCREASED SUPPORT OF GEOLOGICAL SURVEY
URGED

At the fourth annual Industrial Development Conference held under the auspices of the Southern Division of the American Mining Congress at Atlanta, Georgia, April 11th-12th, the following resolution was unanimously adopted:

WHEREAS, the development of the Mineral Resources of the South means so much in the development of manufacturing industries; building up our population and thereby increasing our markets for agricultural products,

BE IT RESOLVED that the State Legislatures of the South be urged to increase their appropriation to their Geological Surveys; and,

WHEREAS, we recognize the value of topographic maps for all types of engineering, industrial, agricultural and municipal developments, we therefore, urge increased appropriations for such work in the Southern States, and we request that copies of this resolution be forwarded to the Governors of the Southern States with the further request that they be presented to their several legislative bodies.

The American Mining Congress as a national organization strongly endorses this resolution of its Southern Division and we respectfully submit it to you with the hope that it will meet with your approval and that you will at the proper time, do everything possible to further the support of your Geological Survey, and topographic mapping in your state.

RECOMMENDATIONS TO THE GOVERNOR AND
LEGISLATURE

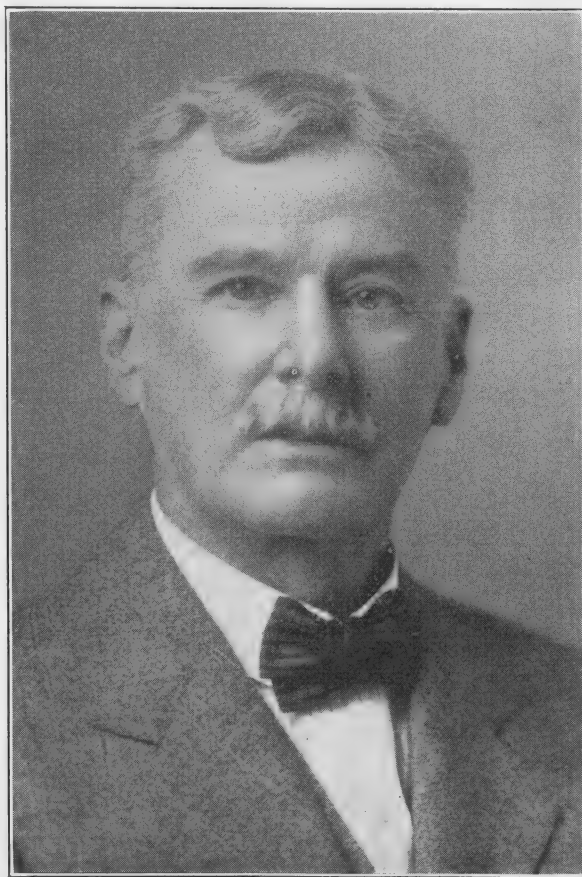
The great natural and mineral wealth of Kentucky justifies continued and increased activity of a scientific nature leading towards its development. The following definite program for the Geological Survey is recommended:

1. New legislation providing small emergency fund of \$10,000 for printing to rehabilitate printing losses occasioned by the fire and water damage of February 23, 1929, Old Capitol Building, Frankfort, Kentucky.
2. A small increase of \$3,000.00 in present budget appropriations from \$57,000.00 to \$60,000.00 annually to enable the Survey to meet the costs of scientific examinations throughout the State commensurate with the rapid expansion of the mineral industry along all lines in Kentucky. In this connection it is held that the Geological Survey should lead the way in all fields of mineral investigation and production rather than be forced because of slightly inadequate funds to follow the development made by the industry itself.
3. A doubling of the State appropriation for cooperative topographic mapping will allow completion of the topographical base map of Kentucky within the next two years. At the present time Kentucky is about 70% topographically mapped. All State departments cooperating, individuals and corporations in the State of Kentucky involved in field work employ and greatly need modern topographical maps in continuation of their work, and these maps for the unsurveyed 30% of the area on Kentucky are very greatly in demand and are delaying the progress and development in Kentucky over large areas of the Purchase, Pennyroyal, Bluegrass and the Mountains of the Northeastern Kentucky. The present appropriation is \$75,000.00 released from the State Highway Department in cooperation with which these new topographical maps are produced for any particular part of the State desired by the State Highway Engineer and his corps. It is recommended that these appropriations be increased to \$150,000.00 annually from the same source, arrangements already having been made with the U. S. Geological Survey to match this or any amount of money raised by the State of Kentucky for the purpose of completing the topographical base map of Kentucky.

IN MEMORIAM

PROFESSOR ARTHUR McQUISTON MILLER

Professor Arthur McQuiston Miller was born at Eaton, Ohio, August 6, 1861, the son of Robert and Margaret Ann McQuiston Miller. His death was due to an acute heart attack at Palatka, Florida, October 28, 1929, while en route to his winter home at Orlando, Florida, in the company of his brother, Dr. Marion Mills Miller, of Lexington, Kentucky, a physician and a nurse. Besides his brother he is survived by a nephew, Clarence Arthur Miller, now a student at Princeton University.



PROF. A. M. MILLER

Graduating from the public schools in Eaton, Professor Miller did his undergraduate work at Worcester College, receiving in 1884 the A. B. degree. In 1887 he was given the A. M. degree from Princeton University and then spent three years teaching. In 1891 he studied abroad at the University of Munich in Germany under Dr. Karl von Zittle, the great paleontologist. After completing his post-graduate work on the Continent, Professor Miller came to the University of Kentucky as a teacher of geology and paleontology. In 1895 he also taught classes in Biology, and in 1908, while head of the Department of Geology and Zoology, he became Dean of the College of Arts and Sciences of the University of Kentucky.

Having been an enthusiastic student in his younger years he now became a proficient and able teacher of Science, particularly geology, and an important contributor to the general literature on this subject. He was identified intermittently as Assistant Geologist with the Kentucky Geological Survey over a period of twenty years from 1905 to 1925, serving under Professor Norwood on the Third Survey, under Mr. Hoeing on the Fourth Survey and the present Director on the Fifth and Sixth Surveys. His published works on geology pertain almost entirely to Kentucky and total about twenty-five titles, and approximately 775 pages. Of these his most notable contribution was the "Geology of Kentucky," a 400 page compendium published in 1919 as Bulletin No. 2 by the Fifth Kentucky Geological Survey. It contains a summary of the principal facts, together with much detail, bearing upon the geology and paleontology of Kentucky as known up to the date of publication. This volume has enjoyed a wide acceptance and use among students of the geology and mineral resources of this Commonwealth.

In the field of investigative geology, Professor Miller's forte, whether in the employ of the Kentucky Geological Survey or in the execution of problems of personal address, was the Ordovician outcrop of central Kentucky. By this it should not be understood that he was any foreigner to other portions of this State, for he was not; but it is certain that he spent more time and accomplished a greater work in the prosecution of his Bluegrass studies than elsewhere in the State. In the field of Ordovician stratigraphy and paleontology he ranked very high, as his

separate published reports on the geology of Franklin and Woodford counties as well as his brief earlier study on the "Lead and Zinc Bearing Rocks of Central Kentucky" will readily attest. He also wrote the geology of the Georgetown Quadrangle and was much interested in Kentucky archaeology.

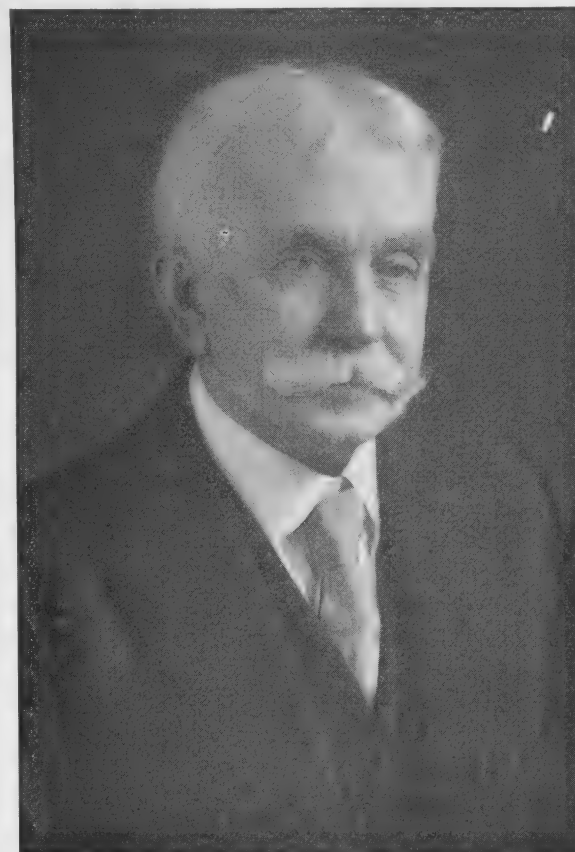
During the latter years of Professor Miller's life illness of a protracted and irremediable character made it necessary for him to abandon his pursuit of teaching and seek some relief in travel. He then turned to the exploration of more distant fields. This radical departure attained for him some conservation of his strength and undoubtedly preserved his faculties several years longer than might otherwise have been the case.

In the vicinity of Ashville, North Carolina, he found for a time so great an improvement in health as to cause him again, and for a considerable period, to address himself to matters of field geology. The news of his death coming suddenly and without warning to his immediate friends and former students, was a real shock. His remains were returned to his old home "Maxwellton" at Lexington and later burial was made at Eaton, Ohio. Professor Miller was a member of the Geological Society of America, the American Association for the Advancement of Science, the American Association for Petroleum Geologists, the American Association of the University of Professors, the Kentucky Academy of Science, the Filson Club of Louisville, and the Bradford Historical Association at Lexington.

In the death of Professor Arthur M. Miller, Kentucky loses a well and widely known geologist, a scholar of note and a gentleman in every sense of the word. It was the writer's privilege to know Professor Miller well, to have lived in his home, and to have been an assistant Professor of Geology in the Department of the University of Kentucky, in 1918 and 1919, of which he was the head. Later it was at the solicitation of the State Geologist that he completed his "Geology of Kentucky" and his "Geology of Woodford County," for each of which the vehicle of publication was made ready through this survey. It is with genuine sorrow and regret that these few ineffective words are penned to record his passing to the *great beyond*.

DR. PHILIP NORTH MOORE

Dr. Philip North Moore, the son of Colonel Henry C. and Susan North Moore, was born December 8, 1849, at Connersville, Indiana. His death, which occurred suddenly on January 19, 1930, at St. Luke's Hospital in St. Louis, Missouri, was caused by a cerebral hemorrhage following a minor operation. Although eighty-one years of age, Dr. Moore's physical condition in his latter years was excellent. The operation for which he had been receiving hospital treatment had been successful and convalescence was anticipated, when the end came unexpectedly. The announcement of his sudden death spread rapidly,



DR. PHILIP NORTH MOORE

and to his host of friends and lifelong professional acquaintances it was a great shock.

Born to the purple in geological and engineering circles, Dr. Moore rose during his life from an obscure position as Assistant on the Michigan Geological Survey to the Presidency of the American Institute of Mining and Metallurgical Engineers. He became one of the most widely known members of his profession in America. During Dr. Moore's youth, his father, a native of Pennsylvania, was engaged as a Civil Engineer in charge of canal construction in Indiana. Later he was in charge of railroad building as chief engineer for the Missouri-Pacific lines. The boy spent his early years in his native State, Indiana, and in Ohio and Missouri. In 1870 Dr. Moore was graduated from Miami University at Oxford, Ohio, with the degree of Bachelor of Arts. He later enrolled as a special student at the Columbia University School of Mines and was graduated in 1873 with the degree of Master of Arts.

While a student at Columbia University, Dr. Moore was offered the position of assistant on the Michigan Geological Survey for field work in the iron region. He served a year in that capacity and obtained a similar position with the Missouri Geological Survey, under Professor Raphael Pumpelly, then State Geologist. Failure of sufficient legislative appropriations in Missouri cut this work short after a year's activity and caused Dr. Moore to seek another position which he found in this State under Professor N. S. Shaler of Harvard University, who was at that time the State Geologist of Kentucky.

Well trained in the practice of Geology and mining engineering, and equipped with a broad experience in the iron ores of the central Interior of the United States, Dr. Moore brought to the personnel of the Shaler (second) Geological Survey of Kentucky good mental and physical equipment. His first published reports for the Kentucky Geological Survey were in the nature of geological reconnaissances published in 1877 on Grayson, Edmonson, Hart, Butler and Muhlenberg counties in western Kentucky. These were followed by reports in 1878 on the geology and mineral resources of the upper Cumberland valley in Bell and Harlan counties; Wolf and Breathitt counties; Bell, Harlan, Letcher and Pike counties in Eastern Ken-

tucky; and in Hancock and other counties in the Western Kentucky coal field. His last reports were on iron ores in Boyd, Carter, and Greenup counties; and the Red River and Cumberland Gap regions of Eastern Kentucky.

Altogether eleven separate reports prepared by Dr. Moore on the geology of Kentucky were published by the Second Geological Survey, mostly prior to 1879. All of his publications were reprinted as group publications by the John R. Procter Survey in 1884. For many years following the completion of these studies by Dr. Moore, his reports were the most authentic discussions of the geology and mineral resources of the several regions upon which they were written, and even today they constitute a valuable source of information relative to these broad areas in both Eastern and Western Kentucky.

After four years in Kentucky, Dr. Moore again found himself out of employment for the same reason that had curtailed his activities in Missouri—lack of appropriations. He went to Europe for six months to study and returned to America in the spring of 1878 and set out for Leadville, Colorado, where he was one of the pioneers.

Dr. Moore remained in Leadville until early in 1882, when he received an unexpected offer to open an iron property in Kentucky. This was known as the Slate Creek Iron Property in Bath County. Upon it had been built, in 1791, the first blast furnace west of the Alleghanies. He remained in personal charge of the property for seven years.

In 1889 Dr. Moore settled in St. Louis and established offices as a consulting engineer. He continued to make his home there until his death, but in his professional life he spent many years, from time to time, on engineering and mining projects in virtually every state in the Union and in Canada and Alaska and in Mexico prior to the 1911 revolution which unseated Diaz.

In the course of his practice Dr. Moore organized and became manager of the Conrey Placer Mining Company of Montana. He was one of the owners and president of the Tecumseh Iron Company of Alabama and once held the presidency of the Rose Run Iron Company of Kentucky, and later the Admiralty Zinc Company of Oklahoma, which he headed from 1915 to 1917.

Dr. Moore was a member of the Engineering Council from 1918 to 1920 and of its successor, the American Engineering Council of the Federated Engineering Societies from 1921 to 1924. He was vice president of the body in 1923. His greatest elective honor was bestowed upon him in 1917 when he became president of the American Institute of Mining Engineers.

In 1879 Dr. Moore married Miss Mary Eva Perry of Rockford, Ill., who went with him to Leadville in the early days of his career.

Dr. Moore was made an honorary member of the Engineers' Club of St. Louis in 1920 and in 1927 was feted by the organization as its oldest member. He was a member of Phi Beta Kappa, Tau Beta Pi, the St. Louis Academy of Science, the Round Table and Noonday clubs of St. Louis. In 1920 Miami University conferred upon him the honorary degree of LL. D., and in 1928 he was elected to head the St. Louis Institute of Consulting Engineers.

Besides his widow, Dr. Moore is survived at this writing by a daughter, Miss Elizabeth Moore of St. Louis, and a son, Harry N. Moore of Denver.

AVAILABLE MAPS AND REPORTS

There are now ready and available for immediate distribution through the Kentucky Geological Survey to any interested individual, corporation or institution requesting same a large number of special reports and maps, prepared by this and previous Surveys. These publications cover the general geology and development of many of the mineral resources of Kentucky and may be had for fixed charges to cover printing, wrapping and transportation. The early reports of the 1st and 2nd Geological Surveys (Owen, Shaler and Procter) are now entirely exhausted. The publications of subsequent Surveys, including the present (Sixth) Kentucky Geological Survey, which are now available are listed in chronological sequence by title and authors. The charge required by the statutes is indicated. The number of cloth bound reports now in stock is 18,351 as contrasted to 23,300 which were in stock two years ago. The total number of paper bound pamphlets in stock relative to geology is 7,618. Two years ago it was 10,326, a loss of 9,657 reports is thus shown caused by the fire. The total number of maps is 59,000. The total number of maps and reports now available for distribution is 84,969. A request for any of these publications addressed to the Director, when accompanied by the required amount of postage in stamps (checks or money orders may be used) will be promptly filled until the edition is exhausted. The list given is essentially a duplicate of the one used in the official correspondence of the Kentucky Geological Survey.

LIST OF AVAILABLE MAPS AND REPORTS

January 1, 1930.

Instructions for Ordering: Single copies of any and all maps and reports listed hereunder will be mailed to any interested individual, corporation, company, or institution requesting same, providing the exact fee as indicated is forwarded with the request. Packages will not be sent express collect. This survey will not bill any applicant for required charges. Avoid delay and confusion by accompanying your letter of request with money order or check in the proper amount.

GEOLOGICAL REPORTS

SERIES VI.

(1920-1930)

"WILLARD R. JILLSON SURVEY"

| | Required Charge |
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| Vol. 1.—Glass Sands of Kentucky. C. H. Richardson. 1920 | \$1.25 |
| Vol. 2.—Economic Papers on Kentucky Geology. W. R. Jillson. 1921 | Edition Exhausted |
| Vol. 3.—Oil Field Stratigraphy of Kentucky. W. R. Jillson. 1921 | Edition Exhausted |
| Vol. 4.—Geology of the Golconda Quadrangle. Stuart Wells. 1921 | Edition Exhausted |
| Vol. 5.—Geology and Coals of Webster County. L. C. Glenn. 1921 | Edition Exhausted |
| Vol. 6.—Sixth Geological Survey. W. R. Jillson and others. 1921 | Edition Exhausted |
| Vol. 7.—Mississippian Series in Eastern Kentucky. Chas. Butts. 1922 | Edition Exhausted |
| Vol. 8.—Clay Deposits of Kentucky. H. Ries. 1922 | Edition Exhausted |
| Vol. 9.—Geography of the Jackson Purchase. D. H. Davis. 1923 | Edition Exhausted |
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| Vol. 11.—Building Stones of Kentucky. C. H. Richardson. 1923 | 1.25 |
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| Vol. 14.—Surface Waters of Kentucky. W. R. King. 1923 | 1.00 |
| Vol. 15.—Geological Research in Kentucky. W. R. Jillson. 1923 | Edition Exhausted |
| Vol. 16.—Wild Life in Kentucky. W. D. Funkhouser. 1925 | Edition Exhausted |
| Vol. 17.—Geology and Mineral Resources of Kentucky. W. R. Jillson. 1928 | 1.25 |
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| Vol. 33.—Devonian Rocks of Kentucky. T. E. Savage. 1929 | 1.25 |
| Vol. 34.—Ancient Life in Kentucky. Webb and Funkhouser | 1.75 |
| Vol. 35.—Administrative Report. W. R. Jillson. 1930 | 1.25 |
| Vol. 36.—Paleontology of Kentucky. (A Symposium) (Mss.) | 1.25 |
| Vol. 37.—Geology of Henderson Co. C. V. Theis. (Mss.) | 1.25 |
| Vol. 38.—Geography of Kentucky. W. R. Jillson. (Mss.) | 1.25 |
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| Vol. 40.—Geology of Western Coalfield. L. C. Glenn. (Mss.) | 1.25 |

SERIES V.

(1919-20.)

DEPARTMENT OF GEOLOGY AND FORESTRY

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| Bulletin No. 1.—Oil and Gas Resources of Kentucky. W. R. Jillson. 1919 | \$1.25 |
| Bulletin No. 4.—Contributions to Kentucky Geology. W. R. Jillson. 1920 | 1.25 |



FAULTED MISSISSIPPIAN LIMESTONE AT KUTTAWA

These offset beds on the Cumberland River together with the economics of the region are discussed in the Survey's new report on the Geology of the Smithland and Eddyville Quadrangles completed as a manuscript during 1929 by A. H. Sutton.

SERIES IV. (1912-18.)

"JOSEPH B. HOEING SURVEY"

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| Vol. 1, Pt. 2.—Fire Clays of Northeast Kentucky. Technology of Kentucky Clays, Coals of Upper Licking River, Coals of North Fork of Kentucky River, Oolitic Limestones of Warren Co., Coke, Elevation and Astronomical Stations, 1913 | \$1.25 |

SERIES III. (1904-1912.)

"CHARLES J. NORWOOD SURVEY"

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| Bulletin No. 3.—Coals, Clays, Mineral Waters, etc., of Ky. Robert Peter. 1905 | \$0.50 |
| Bulletin No. 5.—Upper Ordovician Rocks of Kentucky and their Bryozoa. John M. Nickles. 1905 | .50 |
| Bulletin No. 6.—Kentucky Clays. James H. Gardner. 1905 | 1.25 |
| Bulletin No. 7.—Silurian, Devonian and Irvine Formation of East Central Kentucky. A. F. Foerste. 1906 | 1.25 |
| Bulletin No. 14.—Coals of the Pineville Gap Region. A. R. Crandall and G. M. Sullivan. 1912 | 1.25 |
| Bulletin No. 16.—The Waverlain Formation of East Central Kentucky. W. C. Morse and A. F. Foerste. 1912 | .50 |
| Bulletin No. 17.—Coals of the Tradewater Region. L. C. Glenn. 1912 | .50 |
| Bulletin No. 18.—Coals of Quicksand Region. F. Julius Fohs. 1912 | .50 |
| Bulletin No. 20.—Coals of the Hartford Quadrangle. James H. Gardner. 1912 | .50 |
| Bulletin No. 21.—Value of Dix River, as a Source of Water Power. A. F. Foerste. 1912 | .50 |
| Report of Progress for the years 1908 and 1909. C. J. Norwood | .50 |

Note: The publications of the First and Second Surveys (1854-1892) are completely exhausted in edition.

PAPER BOUND PUBLICATIONS OF KENTUCKY GEOLOGY

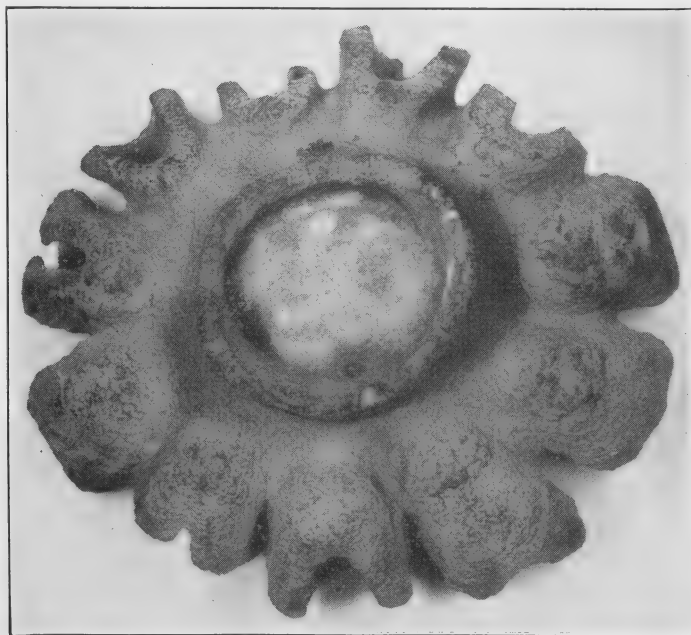
Series VI.

PAMPHLETS

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| 5. Administrative Report. 1924-1925. Pam. V | \$0.15 |
| 6. State Parks in Kentucky. Pam. VI. 1926 | .15 |
| 7. Resumme of Kentucky's Mineral Resources. Pam. VII. 1926 | .15 |
| 8. Fireclays of Northeastern Kentucky. Pam. VIII. 1926 | .15 |
| 9. Clays of Kentucky, The. Pam. IX. 1926 | .15 |

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| 10. Oil Shales of Eastern United States. Pam. X. 1926 | .15 |
| 11. A Bibliography Relating to Geology. Pam. XI. 1926 | .15 |
| 12. Geology Island Creek Oil Pool. Pam. XII. 1927 | .15 |
| 13. Kentucky's Mineral Resources. Pam. XIII. 1927 | .15 |
| 14. Pollution of Stream Waters in Kentucky. Pam. XIV. 1927 | .15 |
| 15. Bentonite Deposits of Kentucky. Pam. XV. 1928. (In Press) | .15 |
| 16. Kentucky Rock Asphalt. Pam. XVI. 1928 (In Press) | .20 |
| 17. Kentucky State Parks. Special Pub. Illustrated. 1927 | .50 |
| 18. Hypothesis of a Lost Ozarkia. Maps and Illustrations. 1928 (In Press) | .15 |
| 19. Geology and Geography of Kentucky. A topical outline. 1928 (In Press) | .15 |
| 20. Administrative Report (Year 1926-1927). Pam. 20 | .25 |
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| 22. Geology and Physiography of the Midland Trail in Kentucky. 1929. Pam. 22 | .25 |
| 23. Administrative Report (Years 1928-1929). Pam. 23 | .25 |



A RARE ORDOVICIAN SPONGE

During the past two years the Director has been making a collection of these unusual fossils. *Brachiospongia digitata* occurs only in two localities in Franklin County, Ky.

REPRINTS

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| 5. Fault Pattern of Kentucky. 1924 | .15 |
| 6. Glacial Pebbles in Eastern Kentucky. 1924 | .15 |
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| 10. Major Drainage Modifications of Big Sandy River. 1926 | .15 |
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| 15. Principal Scientific Achievements of Year 1923. 1923 | .15 |
| 16. Shaded Topographic Maps. 1927 | .15 |
| 17. Unique Devonian Sandbar. 1923 | .15 |
| 18. Unused Wealth—An Opportunity. 1926 | .15 |
| 19. Trans. Ky. Academy of Science. 1924 | 1.00 |

MAPS: SERIES VI. (1920-1929.)

This list contains 325 separate county and regional maps, geological sections and topographic sheets now available.

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|---|--------|
| Geological Map of Kentucky (1:500,000) in Colors. W. R. Jillson. 1929 | \$2.00 |
| Geological Map of Kentucky, showing Oil and Gas Pools and Pipe Lines, Eastern and Western Coal Fields, Faults, Anticlines, Coal Mines, Igneous Dikes, etc., by W. R. Jillson and L. M. Sellier. January, 1927 | 1.00 |
| Relief Map of Kentucky. G. H. Renshaw. 1924 | .25 |
| Topographic Map of Kentucky. R. L. Harrison and W. H. Gill. 1929 | 1.00 |
| Geographic Map of Kentucky (1:500,000). Harrison and Gill. 1928 | 1.00 |
| Geographic Map of Kentucky. Scale: 1 inch=30 miles. 1929 | .05 |
| State Map Packet. 1929. (Contains 3 large State maps) | 2.75 |

SURFACE STRUCTURAL GEOLOGY MAPS—38

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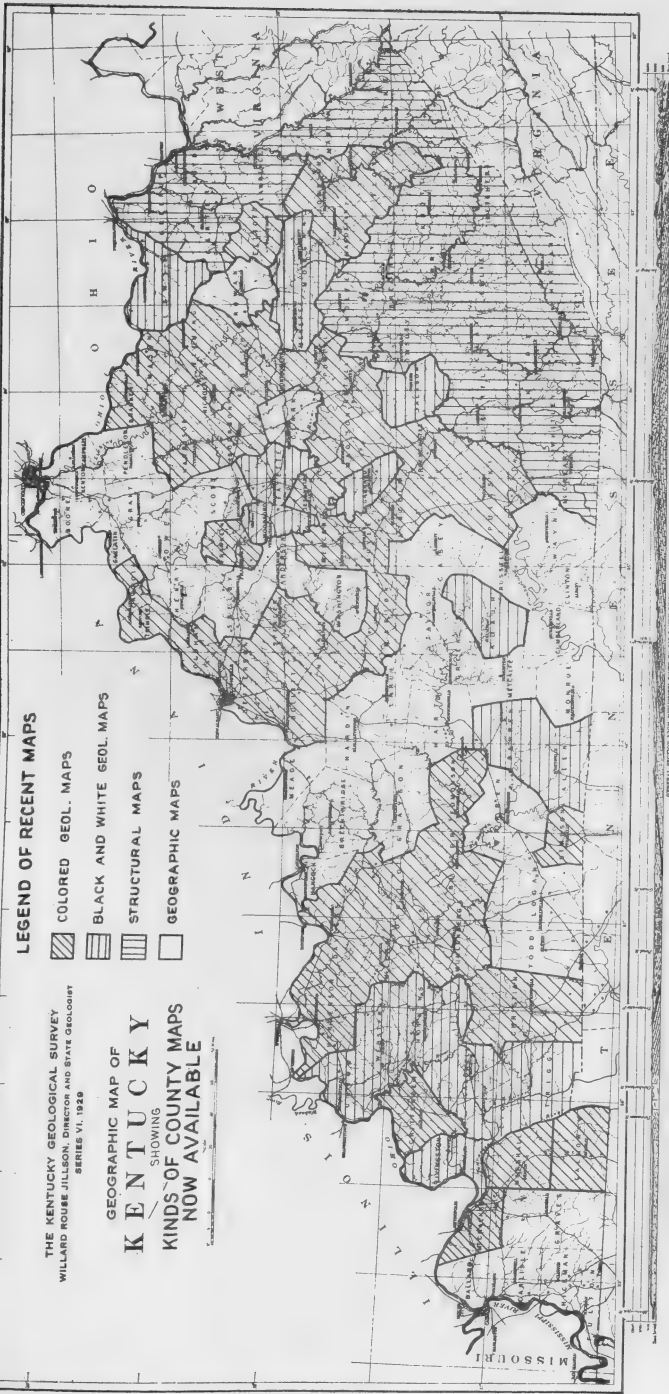
THE KENTUCKY GEOLOGICAL SURVEY
WILLARD ROUSE JILLSON, DIRECTOR AND STATE GEOLOGIST
SERIES VI, 1929

GEOGRAPHIC MAP OF **KENTUCKY** SHOWING KINDS OF COUNTY MAPS NOW AVAILABLE

Scale 1:500,000

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UNITED STATES
7 DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WASHINGTON

January 23, 1930.

Dr. W. R. Jillson,
State Geologist and Director,
Kentucky Geological Survey,
Frankfort, Kentucky.

My dear Doctor Jillson:

I am very glad of the opportunity at this time to endorse the cooperative topographic mapping program that you contemplate to undertake in the State of Kentucky during the next biennium. Such a program will expedite the early completion of the topographic map of the State at costs probably lower at the present time than in the future. But, much more important than costs of such surveys are the benefits that can be expected: the earlier an adequate base map of the whole of Kentucky is available for use, the better for all citizens of your State interested in internal development. Experience shows that the cost of mapping is sometimes saved several times over in the cost of highway, railroad, or other development projects.

It was in recognition of the basic economics of the subject that led the President in an announcement to the press in October to state that he regarded the early completion of the topographic mapping of the country as of very great economic importance to the various State and Federal governmental activities.

If the Governor of the State of Kentucky, through the State Highway Department, should set aside \$100,000 a year during the next biennium for cooperative topographic mapping, the Federal Government, through the Geological Survey, has authority to allot a like amount, thus doubling the purchasing power of the State's funds.

Yours very cordially,

Geo. Otis Smith
Director.

\$200,000 offer to Kentucky by U. S. Geological Survey.

| | Required Charge |
|---|--------------------|
| Elm Lick Coal; Ohio and Butler Cos. J. H. Gardner. 1925 | .75 |
| Estil County. Freeman, Mayfield and Sutton. 1929 | 1.00 |

AREAL GEOLOGY MAPS—Continued

| | |
|---|------|
| Fayette County. McFarlan and Robinson. 1926 | .75 |
| Fleming County. R. Miller and others. 1929 | 1.00 |
| Franklin County. A. M. Miller and J. J. Wolford. 1929 | 1.00 |
| Garrard County. A. C. McFarlan and S. Withers. 1927 | .75 |
| Colconda and Cave-in-Rock Quadrangles. S. Weller. 1925 | 1.00 |
| Harrison County. P. H. Dunn. 1929 | 1.00 |
| Hartford Quadrangle. J. H. Gardner. 1925 | .75 |
| Henderson County. C. V. Theis. 1927 | 1.00 |
| Hopkins County. C. V. Theis. 1924 | 1.00 |
| Jefferson County. C. Butts. 1930 | 1.00 |
| Jessamine County. McFarlan and Pirtle. 1929 | 1.00 |
| Jeptha Knob. W. H. Bucher. 1925 | .75 |
| Letcher County. A. F. Crider. 1915 | .75 |
| Lewis County. E. S. Perry. 1925 | .75 |
| Lincoln County. McFarlan and Wesley. 1929 | 1.00 |
| Livingston County. S. M. Mayfield. 1926 | .75 |
| Lyon County. J. G. Woodruff. 1926 | .75 |
| Madison County. A. C. McFarlan and S. S. Goodwin. 1929 | 1.00 |
| Marion County. R. Miller and others. 1929 | 1.00 |
| Mason County. P. H. Dunn and J. J. Wolford. 1929 | 1.00 |
| McCracken County. J. K. Roberts and R. P. Meacham. Sept. 1, 1929 | 1.00 |
| McLean County. L. C. Robinson. 1929 | 1.00 |
| Menifee County. Robinson and others. 1927 | .75 |
| Mercer County. A. C. McFarlan and S. S. Goodwin. 1929 | 1.00 |
| Montgomery County. A. C. McFarlan and S. S. Goodwin | 1.00 |
| Morehead Quad. D. Crabb. 1929 | 1.00 |
| Muhlenberg County. J. G. Woodruff and R. Miller. 1929 | 1.00 |
| Nelson County. W. H. Shideler, and others. 1929 | 1.00 |
| Nicholas County. J. J. Wolford. 1930 | 1.00 |
| Ohio County. W. R. Jillson. 1928 | 1.00 |
| Oldham County. R. Miller and G. Briggs. 1929 | 1.00 |
| Powell County. R. Miller and G. Briggs. 1929 | 1.00 |
| Princeton Quadrangle. S. Weller. 1926 | .75 |
| Pulaski County. S. Withers. 1928 | 1.00 |
| Robertson County. J. J. Wolford. 1930 | 1.00 |
| Simpson County. Miller and Crabb. 1930 | 1.00 |
| Spencer County. W. H. Shideler. 1929 | 1.00 |
| Trigg County. Roberts, Sutton and Mayfield. 1929 | 1.00 |
| Trimble County. W. H. Shideler. 1929 | 1.00 |
| Union County. Theis, Glenn and Lee. 1929 | 1.00 |



MISSISSIPPIAN MIDLANDS AT CASCADE CAVERNS
A pamphlet is being prepared describing these beautiful caves on U. S.
Route 60 in Carter County, Kentucky. Willard Jillson, III in foreground

| | Required Charge |
|---|--------------------|
| Webster County. L. C. Glenn. 1923 | 1.00 |
| Woodford County. A. M. Miller. 1924 | .75 |

GEOGRAPHIC MAPS—51

| | |
|--|-----|
| Anderson County. J. L. Bissell. 1923 | .50 |
| Ballard County. S. Withers. 1927 | .50 |
| Boone County. J. L. Bissell. 1923 | .50 |
| Boyle County. H. D. Hunter. 1926 | .50 |
| Bracken County. Sherwood and McGraw. 1926 | .50 |
| Bullitt County. Raymond Miller. 1925 | .50 |
| Calloway County. W. E. Bach. 1927 | .50 |
| Campbell and Kenton Counties. J. L. Bissell. 1923 | .50 |
| Carlisle County. Bishop and Montgomery. 1927 | .50 |
| Carroll County. R. Miller and G. Briggs. 1929 | .50 |
| Carroll and Gallatin Counties. J. L. Bissell. 1923 | .50 |
| Casey County. E. B. Boston. 1924 | .50 |
| Clark County. H. D. Hunter. 1926 | .50 |
| Clinton County. Spencer Withers. 1925 | .50 |
| Edmonson County. W. R. Jillson. 1929 | .50 |
| Fleming County. Sherwood and McGraw. 1925 | .50 |
| Franklin County. U. S. G. S. Base. 1929 | .50 |
| Fulton County. Lane and Miller. 1925 | .50 |
| Gallatin and Carroll Counties. J. L. Bissell. 1923 | .50 |
| Grant County. G. W. Pirtle. 1926 | .50 |
| Graves County. Lansing, Bishop and Montgomery. 1927 | .50 |
| Hardin County. G. W. Pirtle and R. Miller. 1925 | .50 |

| | Required Charge |
|--|-----------------|
| Harrison County. G. Briggs and S. Withers. 1929 | .50 |
| Hart County. E. Slagel. 1925 | .50 |
| Henry County. G. Wesley. 1927 | .50 |
| Hickman County. Bishop and Montgomery. 1929 | .50 |
| Kenton and Campbell Counties. J. L. Bissell. 1923 | .50 |
| Larue County. Pirtle and Crider. 1924 | .50 |
| Logan County. J. L. Bissell. 1924 | .50 |
| Mammoth Cave; Course of and Topography. J. M. Weller. 1927 | .50 |
| McCracken County. S. Withers. 1927 | .50 |
| Madison County. W. E. Bach. 1929 | .50 |
| Marshall County. W. E. Bach. 1928 | .50 |
| Mason County. Sherwood and McGraw. 1926 | .50 |
| Mercer County. Bach and Wesley. 1929 | .50 |
| Nelson County. Withers and others. 1928 | .50 |
| Nicholas and Robertson Counties. E. S. Perry. 1925 | .50 |
| Ohio County (Northeast.) Shelton and Chidsey. 1925 | .50 |
| Oldham County. R. Miller. 1925 | .50 |
| Owen County. F. W. Bertsch. 1923 | .50 |
| Pendleton County. Briggs, Bach and Wesley. 1929 | .50 |
| Robertson and Nicholas. E. S. Perry. 1925 | .50 |
| Rowan County. F. Martin. 1925 | .50 |
| Russell County. E. B. Boston. 1924 | .50 |
| Scott County. J. L. Bissell. 1923 | .50 |
| Simpson County. W. A. Shelton. 1924 | .50 |
| Spencer County. Withers and Briggs. 1928 | .50 |
| Todd County. R. C. Lane. 1924 | .50 |
| Trigg County. J. G. Woodruff. 1926 | .50 |
| Trimble County. G. W. Pirtle. 1925 | .50 |
| Washington County. Bach. 1930 | .50 |

SOIL MAPS—9

| | |
|---|-----|
| Adair County. J. W. Norwood and S. C. Jones | .50 |
| Green County. J. W. Norwood and S. C. Jones | .50 |
| Jackson's Purchase. Hoeing and Loughridge. 1886 | .50 |
| Mason County. U. S. Dept. Ag. 1903 | .50 |
| Muhlenberg County. U. S. Dept. Ag. and Ky. Ag. St. 1923 | .50 |
| Rockcastle County. U. S. Dept. Ag. 1910 | .50 |
| Shelby County. U. S. Dept. Ag. and Ky. Ag. St. 1916 | .50 |
| Taylor County. J. W. Norwood and S. C. Jones | .50 |
| Webster County. J. W. Norwood and S. C. Jones | .50 |

OLD RECONNAISSANCE GEOLOGIC MAPS AND SECTIONS—10

| | |
|--|-----|
| Boyle and Mercer Counties. J. B. Hoeing and W. M. Linney | .50 |
| Breckinridge County (See Meade and Breckinridge). | |
| Geological Sections, Meade and Breckinridge. Hoeing and Loughridge. 1891 | .50 |

| | Required Charge |
|---|-----------------|
| Geological Section, Anderson and Mercer. W. M. Linney. Series II. Proctor | .50 |
| Jackson's Purchase. R. H. Loughridge. 1885 | .50 |
| Madison County. J. B. Hoeing and John R. Procter | .50 |
| Meade and Breckinridge Counties. Loughridge and Hoeing 1891 | .50 |
| Meade County Gas Wells. R. H. Loughridge. 1891 | .50 |
| Montgomery and Clark Counties. J. C. Fales and W. M. Linney | .50 |
| Trigg and Christian Counties. F. J. Fohs and J. B. Hoeing | .50 |
| Washington and Marion Counties. W. M. Linney and W. T. Knott | .50 |

TOPOGRAPHIC SHEETS

15 cents Each, Remit in Advance

Kentucky Geological Survey and U. S. Geological Survey in Cooperation

- Adolphus Quadrangle, parts of Simpson and Allen Counties.
- Lafayette Quadrangle, part of Allen County.
- Barthell Quadrangle, parts of Wayne and McCreary Cos.
- Beattyville Quadrangle, parts of Powell, Estill, Montgomery, Menifee, Lee, Wolfe, Breathitt, Clark, Owsley, Jackson and Morgan Counties.
- Big Clifty Quad., parts of Hardin, Grayson, Breckinridge.
- Big Stone Gap Quad., parts Harlan and Letcher.
- Bowling Breen Quadrangle, Warren, Allen and Simpson Counties.
- Brownsville Quadrangle, Warren, Edmonson and Butler Counties.
- Buckhorn Quadrangle, parts of Perry, Leslie and Breathitt Counties.
- Bucklodge Quad., parts of Allen and Simpson Cos.
- Burnside Quadrangle, parts of Wayne, Pulaski and McCreary Counties.
- Byrdstown Quad., parts Cumberland, Clinton, Wayne.
- Calhoun Quad., parts of Webster, McLean, Henderson, Daviess, Hopkins Cos.
- Camp Taylor Quadrangle, parts of Jefferson, Bullitt, Spencer, Shelby and Oldham Counties, Kentucky; and Taylor, Posey and Franklin Counties, Indiana.
- Cannelton Quadrangle, parts of Hancock and Breckinridge Counties.
- Cave-in-Rock Quadrangle, parts of Crittenden, Caldwell and Livingston Counties.
- Central City Quadrangle, parts of McLean, Muhlenberg and Ohio Counties.

18. Cincinnati E. & W. Quadrangles, parts of Boone, Kenton and Campbell Counties, Kentucky; and Hamilton and Clermont Counties, Ohio. 20 cents each.
19. Clintwood Quad., parts of Pike Co., Ky., Dickenson and Wise Cos., Va.
20. Cornettsville Quadrangle, parts of Leslie, Knott, Perry and Letcher Counties.
21. Corydon Quadrangle, part of Meade County.
22. Cub Run, parts of Grayson, Edmonson, Hart, and Hardin Counties, Kentucky.
23. Cumberland Gap Quadrangle, parts of Laurel, Knox, Clay, Leslie, Harlan, Bell and Whitley Counties, Ky., Lee Co., Va., Claiborne and Campbell Counties, Tenn.
24. Cynthiana Quadrangle, parts Harrison, Scott and Bourbon Counties.
25. Dawson Springs Quadrangle, parts of Hopkins, Christian and Caldwell Counties.
26. Drakesboro Quadrangle, parts of Muhlenberg, Todd and Logan Counties.
27. Dunmor Quadrangle, parts of Muhlenberg, Butler, Ohio and Logan Counties.
28. Earlington Quadrangle, parts of Webster and Hopkins.
29. Eddyville Quad., parts of Caldwell, Crittenden, Livingston and Lyon Cos.
30. Estillville Quad., small part of Harlan Co., Ky.; Lee, Scott and Wise Cos., Va.
31. Falls of Rough Quadrangle, parts of Hancock, Breckinridge, Ohio and Grayson Counties.
32. Falmouth Quadrangle, parts of Pendleton, Grant and Harrison Counties.
33. Felicity Quadrangle, parts of Campbell, Bracken and Pendleton Counties.
34. Frankfort Quad., parts of Franklin, Woodford, Shelby and Anderson Cos.
35. Georgetown Quadrangle, parts of Scott, Fayette, Woodford and Franklin Counties.
36. Golconda Quadrangle, parts of Livingston and Crittenden Counties, Ky., and Pope and Hardin Counties, Illinois.
37. Greenup Quad., part of Greenup County.
38. Hagan Quad., part of Bell and Harlan Counties.
39. Hardinsburg Quadrangle, parts of Breckinridge and Hancock Counties.
40. Harlan Quadrangle, parts of Harlan, Leslie and Bell Counties.
41. Harold Quadrangle, parts of Martin, Floyd and Pike Counties.
42. Harrodsburg Quadrangle, parts of Woodford, Jessamine, Boyle, Mercer, Fayette, Garrard, Lincoln and Anderson Counties.

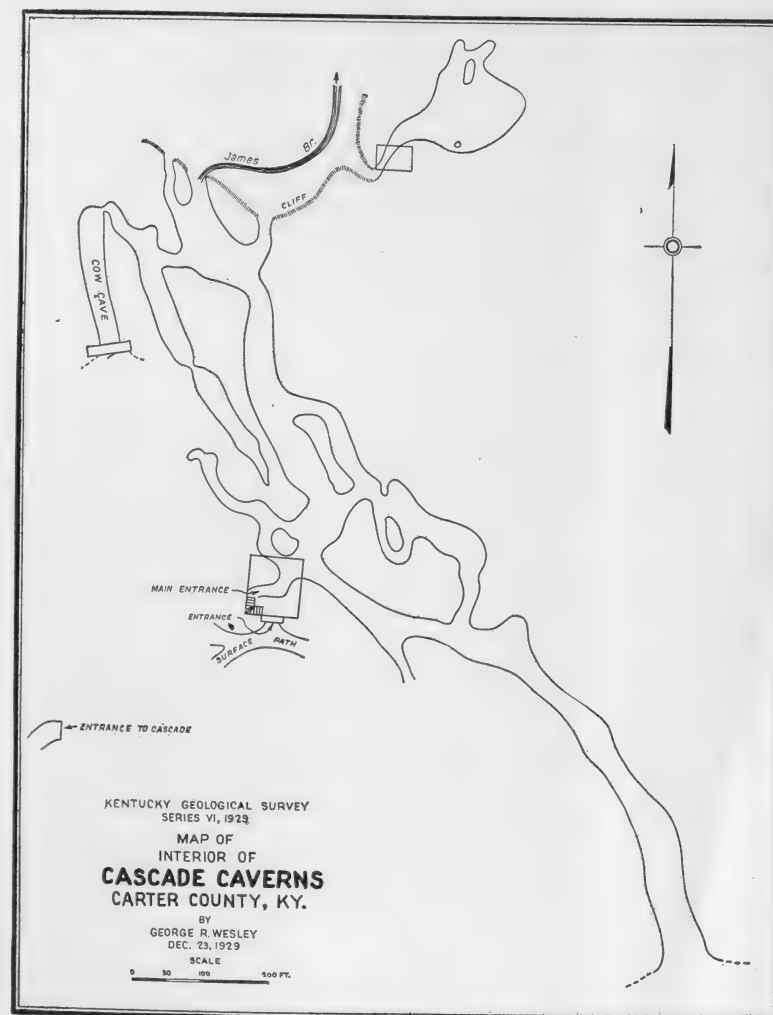


AREAL VIEW OF GREEN-NOLIN RIVER TOPOGRAPHY

This view was taken by U. S. Army aviators at an elevation of 9,000 feet. Note the rather considerable area under timber and brush.

43. Hartford Quadrangle, parts of Butler, Ohio and Muhlenberg Counties.
44. Henderson Quadrangle, part of Henderson County.
45. Higginsport Quadrangle, parts of Bracken and Mason Counties.
46. Hindman Quadrangle, parts of Knott and Floyd Counties.
47. Hurley Quadrangle, parts of Pike County, Ky., and Buchanan Co., Va.
48. Hyden Quadrangle, parts of Leslie, Clay and Perry Counties.
49. Inez Quadrangle, parts of Lawrence, Martin and Johnson Counties.
50. Ironton Quad., parts of Greenup Co., Kentucky, Lawrence and Scioto Co., Ohio.
51. Jonesville Quadrangle, parts of Letcher, Leslie and Harlan Counties, Ky.; Lee County, Va., and Claiborne and Hancock Counties, Tenn.
52. Kenova Quadrangle, parts of Greenup, Boyd, Carter, Lawrence and Elliott Counties.
53. Kasmosdale Quadrangle, parts of Jefferson and Bullitt Counties.
54. La Center Quadrangle, parts of Ballard and McCracken Counties.
55. Lafayette Quadrangle, part of Allen County.
56. La Grange Quadrangle, parts of Shelby, Oldham, Henry, Jefferson, Trimble Counties.
57. Lawrenceburg Quadrangle, part of Boone County.
58. Leitchfield Quad., part of Grayson, Edmonson, Butler Cos.
59. Lexington Quad., Fayette, Clark, Bourbon and Scott in part.
60. Lilly Dale Quad., parts of Cumberland, Clinton, Monroe Cos.
61. Little Muddy Quadrangle, parts of Butler, Warren and Logan Counties.
62. Lockport Quadrangle, part of Owen, Henry, Shelby and Franklin Counties.
63. London Quad., Rockcastle, Pulaski, Lincoln, Garrard, Jackson and Laurel Cos.
64. Louisville Quadrangle, parts of Jefferson, Bullitt and Spencer Counties.
65. Madisonville Quadrangle, parts of Hopkins, Muhlenberg, McLean and Webster Cos.
66. Mammoth Cave Quadrangle, parts of Edmonson, Barren, Warren and Hart Counties.
67. Manchester Quad., Jackson, Owsley, Clay, Leslie, Laurel, Perry, Breathitt, Knox Counties.
68. Mattewan Quadrangle, parts of Pike County, Ky.; Mingo and Logan Cos., W. Va.
69. Middlesboro Quad., part of Bell Co.
70. Monticello Quad., parts of Wayne, Russell, Pulaski.
71. Morehead Quadrangle, parts of Rowan, Carter, Elliott, Morgan and Menifee Cos.

72. Morganfield Quad., parts of Union, Webster and Henderson Counties.
73. Morning View Quadrangle, parts of Campbell, Kenton and Pendleton Cos.
74. Mound City Quad., part of Ballard County.
75. Mt. Eden, parts of Shelby, Anderson, Franklin and Spencer Counties, Kentucky.



UNDERGROUND OR PASSAGE MAP OF CASCADE CAVERNS
A thorough investigation of these very unusual and delightful caves was made by the Director during the past year.

76. Naugatuck Quadrangle, parts of Martin and Lawrence Counties.
77. Newberg Quadrangle, parts of Henderson and Daviess Counties.
78. New Haven Quadrangle, part of Union County.
79. Nolansburg Quadrangle, parts of Harlan and Letcher Cos., Ky., and Lee Co., Va.
80. Nortonville Quadrangle, parts of Hopkins, Muhlenberg, Christian and Todd Cos.
81. Owensboro Quadrangle, part of Daviess County.
82. Paducah Quad., part of McCracken and Livingston Counties.
83. Paintsville Quadrangle, parts of Lawrence, Johnson, Morgan and Magoffin Cos.
84. Pikeville Quadrangle, parts of Pike, Floyd, Knott and Letcher Counties.
85. Pleasureville Quadrangle, parts of Henry and Shelby Cos.
86. Pound Quadrangle, parts of Pike and Letcher Counties.
87. Princeton Quadrangle, parts of Caldwell, Lyon and Hopkins Counties.
88. Prestonsburg Quadrangle, parts of Johnson, Floyd, Magoffin and Knott Counties.
89. Providence Quad., parts of Crittenden, Union, Webster, Caldwell and Hopkins Cos.
90. Red Boiling Springs Quad., parts of Monroe and Allen Cos.
91. Prospect Quadrangle, parts of Jefferson and Oldham Counties.
92. Regina Quadrangle, parts of Pike County, Ky.; Dickenson and Buchanan Cos., Va.
93. Richmond Quad., parts of Jessamine, Fayette, Madison, Estill, Jackson, Garrard Counties.
94. Rising Sun Quadrangle, parts of Boone, Gallatin and Grant Counties.
95. Sadieville Quad., parts of Owen, Scott, Harrison and Franklin Cos.
96. Salt Lick Quad., parts of Bath, Rowan, Menifee Counties.
97. Salyersville Quad., parts of Menifee, Morgan, Wolfe, Magoffin and Breathitt Cos.
98. Scottsville Quadrangle, parts of Allen, Barren and Warren Counties, Kentucky.
99. Sebree Quadrangle, parts of Henderson, Webster and Union Counties.
100. Shawneetown Quad., Union, Crittenden Cos., Ky.; Hardin, Gallatin Cos., Ill.
101. Smithland Quad., parts of Livingston, Marshall and McCracken Counties.
102. Sneedville Quad., part of Harlan Co.
103. Somerset Quad., parts of Pulaski and Casey Counties.
104. Springdale Quad., parts of Lewis, Fleming, and Mercer Counties.
105. Spring Lick Quad., parts of Ohio, Butler and Grayson Counties.

106. Sunnybrook Quad., parts of Clinton and Wayne Counties.
107. Sutherland Quadrangle, parts of Daviess, McLean and Ohio Counties.
108. Taylorsville Quad., parts of Spencer, Shelby, Jefferson and Bullitt Counties.
109. Tell City Quad., parts of Hancock and Daviess Counties.
110. Tompkinsville Quad., part of Monroe Co.
111. Troublesome Quadrangle, parts of Perry, Breathitt and Knott Counties.
112. Uniontown Quadrangle, parts of Union and Henderson Counties.
113. Whitesburg Quadrangle, parts of Letcher, Knott and Harlan Counties.
114. Whitesville Quadrangle, parts of Daviess, Hancock and Ohio Counties.
115. Williamsburg Quadrangle, parts of McCreary, Whitley, Pulaski, Laurel, Knox and Bell Counties, Kentucky, and Scott Campbell, Claiborne Counties, Tennessee.
116. Williamson Quadrangle, parts of Pike and Martin Counties, Ky.; and part of Mingo Co., W. Va.



NIGHT VIEW PETROLEUM EXPOSITION

Kentucky was represented at the International Petroleum Exposition at Tulsa, Oklahoma, October 5-12, 1929, by the Geological Survey. The Director was personally in charge of the exhibit.

APPENDIX

| | |
|------------------|---------------------------------|
| Division A | U. S. Topographic Maps |
| Division B | Excerpt from Governor's Message |
| Division C | Altitudes in the United States |

APPENDIX A.

U. S. Topographic Maps.

The great value of modern topographical maps to all kinds of field investigations has been repeatedly demonstrated. During the past biennium public interest in a more rapid completion of the topographical base map of the United States has expressed itself in a Presidential order. The story of this executive incident was related as follows in the Chicago Daily Tribune and other papers of this country on October 9, 1929.

FINISH MAPPING U. S. IN 18 YEARS, IS HOOVER ORDER
Million Added to Budget to Complete Surveys
 (Chicago Tribune Press Service.)

Washington, D. C., Oct. 8.—(Special.)—Steps to expedite mapping the topographical features of the entire surface of the United States were taken today by President Hoover. At the direction of the President, the secretaries of commerce and interior have ordered a program under which the topographic, coast and geodetic surveys of the nation are to be completed within eighteen, rather than eighty years.

The new arrangement is to be effected by providing additional appropriations for the topographical and geodetic surveys. According to present plans \$1,000,000 will be added to the 1931 budget.

TO SHOW ENTIRE SURFACE

When the surveys are completed, the United States will have maps showing the exact configuration of the entire surface of the United States, including positions of streams, lakes, roads, and cities. Hills and valleys, as well as lesser changes in elevation and depression, will be recorded.

The President acted after receiving a special report from Secretary of Commerce Lamont and Secretary of the Interior Wilbur which disclosed that the topographical work was lagging. Although the first work of this kind was begun seventy years ago, only 43.6 per cent of the nation has been mapped. At the present progress, which is less than 1 per cent a year, it is estimated that eighty years would be necessary to complete the project. Work on the mapping has been so slow, it was revealed today, that much of the work done twenty or thirty years ago is now out of date.

STATES PAY HALF

Under the present plan, the government pays the cost of work on the public domain and 50 per cent of the expenditures in states. At present several of the eastern seaboard states are mapped. Few of the surveys in the central and western states are as much as 50 per cent completed. The work in Ohio has been completed and the Illinois project is 53 per cent finished. New York state is now completely mapped. The topographical surveys in Indiana are 10 per cent completed; in Iowa, 23 per cent; Michigan, 22 per cent; Wisconsin 31.8 per cent, and in Kentucky about 70 per cent.

APPENDIX B.

WORK OF GEOLOGICAL DEPARTMENT

"In the last biennial period the Geological Department has industriously prosecuted the work of topographically mapping, classifying, geologizing and surveying regions of the State, not heretofore covered by this work, and in doing so has completed about 70 per cent of the State topographically and all but about thirty-five counties geologically, all of which is shown on a splendid new map in colors recently brought out by the department.

"I am informed that no State in the Union has accomplished more through its geological survey in the period mentioned than has Kentucky, and it is confidently asserted by the department that the work can be fully completed in the coming biennial period if reasonable appropriation therefor is made by the General Assembly."

The above passage has been excerpted from the Executive Message of Governor F. D. Sampson, delivered to the General Assembly of Kentucky January 15, 1930.

APPENDIX C.

EXTREME AND MEAN ALTITUDE IN THE UNITED STATES AND IN ITS OUTLYING POSSESSIONS*

| | HIGHEST POINT | | | LOWEST POINT | | | Approx. Mean Alt. |
|-------------------|---------------------|----------------|---------------|------------------|------------|-----------|-------------------------|
| | Name | County | Altitude | Name | County | Altitude | |
| Alabama | Cheaha Mt. | Clay-Talladega | Feet 2,407 | Gulf of Mexico | | Sea level | 500 |
| Alaska | Mount McKinley | | 20,300 | Pacific Ocean | | Sea level | 4,100 |
| Arizona | San Francisco Pk. | Coconino | 12,611 | Colorado River | Yuma | 55 | 650 |
| Arkansas | Blue Mountain | Polk-Scott | 2,800 | Ouachita River | Ashley | | |
| California | Magazine Mts. | Logan | 14,496 | Death Valley | Inyo | ±276 | 2,900 |
| Canal Zone | Mount Whitney | Inyo-Tulare | 1,207 | Caribbean Sea | | Sea level | 6,800 |
| Colorado | Cerro Gaiher | S. W. part | 14,420 | Arkansas River | Prowers | 3,350 | 5,000 |
| Connecticut | Mount Elbert | Lake | 2,355 | Long Island Sd. | | Sea level | 60 |
| Delaware | Bear Mountain | Litchfield | 440 | Atlantic Ocean | | Sea level | 150 |
| District Columbia | Centerville | New Castle | 420 | Potomac River | | Sea level | 100 |
| Florida | Tenleytown | N. W. part | 325 | Atlantic Ocean | | Sea level | 600 |
| Georgia | Iron Mountain | Polk | 4,768 | Atlantic Ocean | | Sea level | |
| Guam | Brasstown Bald | Towns-Union | 1,234 | Pacific Ocean | | Sea level | |
| Hawaii | Mt. Lumum | Is. of Hawaii | 13,823 | Spake River | Nez Perce | 720 | 5,000 |
| Idaho | Borah Peak | Custer | 12,855 | Ohio River | Alexander | 279 | 600 |
| Illinois | Charles Mound | Jo Daviess | 1,241 | Mississippi R. | Vanderburg | 316 | 700 |
| Indiana | Greensfork Tp. | Randolph | 1,540 | Mississippi R. | Lee | 477 | 1,100 |
| Iowa | West boundary | Osceola | 4,615 | Vandergils River | Montgomery | 700 | 2,750 |
| Kansas | On west bdy. | Wallace | 4,135 | Mississippi R. | Fulton | 257 | 100 |
| Kentucky | Big Black Mtn. | Harlan | 4,150 | Gulf of Mexico | | Sea level | 600 |
| Louisiana | N. W. part of Co. | Claborne | 5,267 | Atlantic Ocean | | Sea level | 350 |
| Maine | Mount Katahdin | Piscataquis | 3,849 | Atlantic Ocean | | Sea level | 900 |
| Maryland | Backbone Mtn. | Garrett | 2,805 | Atlantic Ocean | | Sea level | 1,200 |
| Massachusetts | Mount Greylock | Berkshire | 2,023 | Lake Erie | | Sea level | 300 |
| Michigan | Porcupine Mtns. | Ontonagon | 1,920 | Lake Superior | | Sea level | 800 |
| Minnesota | Mesabi Range | St. Louis | 1,800 | St. Francis R. | Dunklin | 230 | 3,400 |
| Mississippi | Near Iuka | Tishomingo | 1,800 | Kootenai River | Flathead | 1,800 | 2,600 |
| Missouri | Taun Sauk Mtn. | Iron | 12,850 | S. E. cor. State | Richardson | 825 | 5,500 |
| Montana | Granite Peak | Park | 13,145 | Colorado River | Clark | 410 | 1,000 |
| Nebraska | S. W. part Co. | Banner | 6,238 | Atlantic Ocean | | Sea level | |
| Nevada | Bdy. Pk. White Mts. | Esmeralda | | | | | |
| New Hampshire | Mount Washington | Coos | | | | | |

*Prepared by Federal Board of Surveys and Maps.

†Elevation supplied by State Geologist.

‡Below sea level.

EXTREME AND MEAN ALTITUDES IN THE UNITED STATES—Continued.

| | HIGHEST POINT | | | LOWEST POINT | | | Approx. Mean Alt. |
|----------------|-------------------|-------------------|---------------|------------------|--------------|-----------|-------------------------|
| | Name | County | Altitude | Name | County | Altitude | |
| New Jersey | High Point | Sussex | Feet 1,805 | Atlantic Ocean | | Sea level | 250 |
| New Mexico | North Truchas Pk. | Rio Arriba | 13,306 | Red Bluff | Eddy | 2,876 | 5,700 |
| New York | Mount Marcy | Sssex | 5,344 | Atlantic Ocean | | Sea level | 1,000 |
| North Carolina | Mount Mitchell | Yancey | 6,684 | Atlantic Ocean | | Sea level | 700 |
| North Dakota | Black Buttes | Slope | 3,468 | Pembina | Pembina | 790 | 1,900 |
| Ohio | Campbell Hill | Logan | 1,550 | Ohio River | Hamilton | 425 | 850 |
| Oklahoma | Black Mesa | Cimarron | 4,978 | Red River | McCurtain | 300 | 1,300 |
| Oregon | Mount Hood | Cl. kms.-Hood R. | 11,253 | Pacific Ocean | | Sea level | 3,300 |
| Pennsylvania | Negro Mountain | Somerset | 3,213 | Delaware River | | Sea level | 1,100 |
| Philippines | Mount Apo | Mindanao Is. | 9,610 | Pacific Ocean | | Sea level | |
| Porto Rico | Luquillo Mtns. | Humacao | 3,532 | Atlantic Ocean | | Sea level | |
| Rhode Island | Durfee Hill | Providence | 3,805 | Atlantic Ocean | | Sea level | |
| Samoa | Leta | Tau Island | 3,056 | | | | |
| South Carolina | Sassafras Mtn. | Pickens | 3,548 | Atlantic Ocean | | Sea level | 200 |
| South Dakota | Harney Peak | Pennington | 7,242 | Big Stone Lake | Roberts | 962 | 350 |
| Tennessee | Clingmans Dome | Sevier | 6,800 | Mississippi R. | Shelby | 182 | 2,200 |
| Texas | El Capitan | Culberson | 8,700 | Gulf of Mexico | | Sea level | 900 |
| Utah | Kings Peak | Duchesne | 13,498 | Beaverdam Creek | Washington | 2,000 | 1,700 |
| Vermont | Mount Mansfield | Lamoille | 4,393 | Lake Champlain | Franklin | 95 | 1,000 |
| Virgin Islands | Mount Rogers | Grayson-Smyth | 5,719 | Atlantic Ocean | | Sea level | 950 |
| Washington | Crown Hill | Is. St. Thomas | 1,550 | Pacific Ocean | | Sea level | |
| West Virginia | Mount Rainier | Pierce | 14,403 | Potomac River | Jefferson | 240 | 1,700 |
| Wisconsin | Spruce Knob | Pendleton | 4,860 | Lake Michigan | | Sea level | 1,500 |
| Wyoming | Rib Hill | Marathon | 1,940 | Belle Fourche R. | | 581 | 1,950 |
| United States | Gannett Peak | Fronton | 13,785 | Death Valley | Crook | 3,100 | 6,700 |
| | Mount Whitney | Inyo-Tulare, Cal. | 14,496 | | Inyo, Calif. | ±276 | 2,500 |

‡Below sea level.

HEIGHTS OF CONTINENTS

| | Approx. Mean Alt. | HIGHEST POINT | | LOWEST POINT | |
|---------------|-------------------------|---|--------------------|----------------------------|--------------------|
| | | Name | Above Sea Level | Name | Above Sea Level |
| North America | Feet 2,000 | Mount McKinley Alaska. | Feet 20,300 | Death Valley, Calif | Feet 276 |
| South America | 1,800 | Mount Aconcagua Chile-Argentina. | 22,834 | Sea level | — |
| Europe | 980 | Mount Elbruz Caucasus Mtns. | 18,465 | Caspian Sea, Russia | 86 |
| Asia | 3,000 | Mount Everest India-China | 29,141 | Dead Sea, Palestine | 1,290 |
| Africa | 1,900 | Kibo Peak (Kilimanjaro) British East Africa. | 19,710 | Libyan Desert | 440 |
| Australia | 1,000 | Mount Kosciusko New South Wales. | 7,328 | Lake Eyre, South Australia | 38 |
| Antarctica | 6,000 | Mount Markham | 15,000 | | |

Greatest ocean depth, near Island of Mindanac 35,400 feet

LIMITS OF THE CONTINENTAL UNITED STATES

Cape Sable, Florida, is in latitude $25^{\circ} 07'$, longitude $81^{\circ} 05'$. The extreme south point of Texas is in latitude $25^{\circ} 50'$, longitude $97^{\circ} 24'$. The Lake of the Woods projection extends to latitude $49^{\circ} 23'$, $04.5''$, at longitude $95^{\circ} 09'$, $11.6''$. The easternmost land is West Quoddy Head, near Eastport, Maine, in longitude $66^{\circ} 57'$, latitude $44^{\circ} 49'$. Cape Alava, Washington, extends into the Pacific Ocean to longitude $124^{\circ} 44'$, at latitude $48^{\circ} 10'$. From the south point of Texas due north to the forty-ninth parallel the distance is 1,598 miles. From West Quoddy Head west along the parallel to the Pacific Ocean the distance is 2,867 miles. These distances are computed to mean sea level.

The length of the Mexican boundary from the Gulf of Mexico to the Pacific Ocean is approximately 2,013 miles. The length of the northern boundary, excluding Alaska, is 3,987 miles.

The geographic center of the United States is in Smith County, Kansas, latitude $39^{\circ} 50'$, longitude $98^{\circ} 35'$.

